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THE Journal OF THE Kansas Medical Society

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VOL. LX
NO. VI

TOPEKA,
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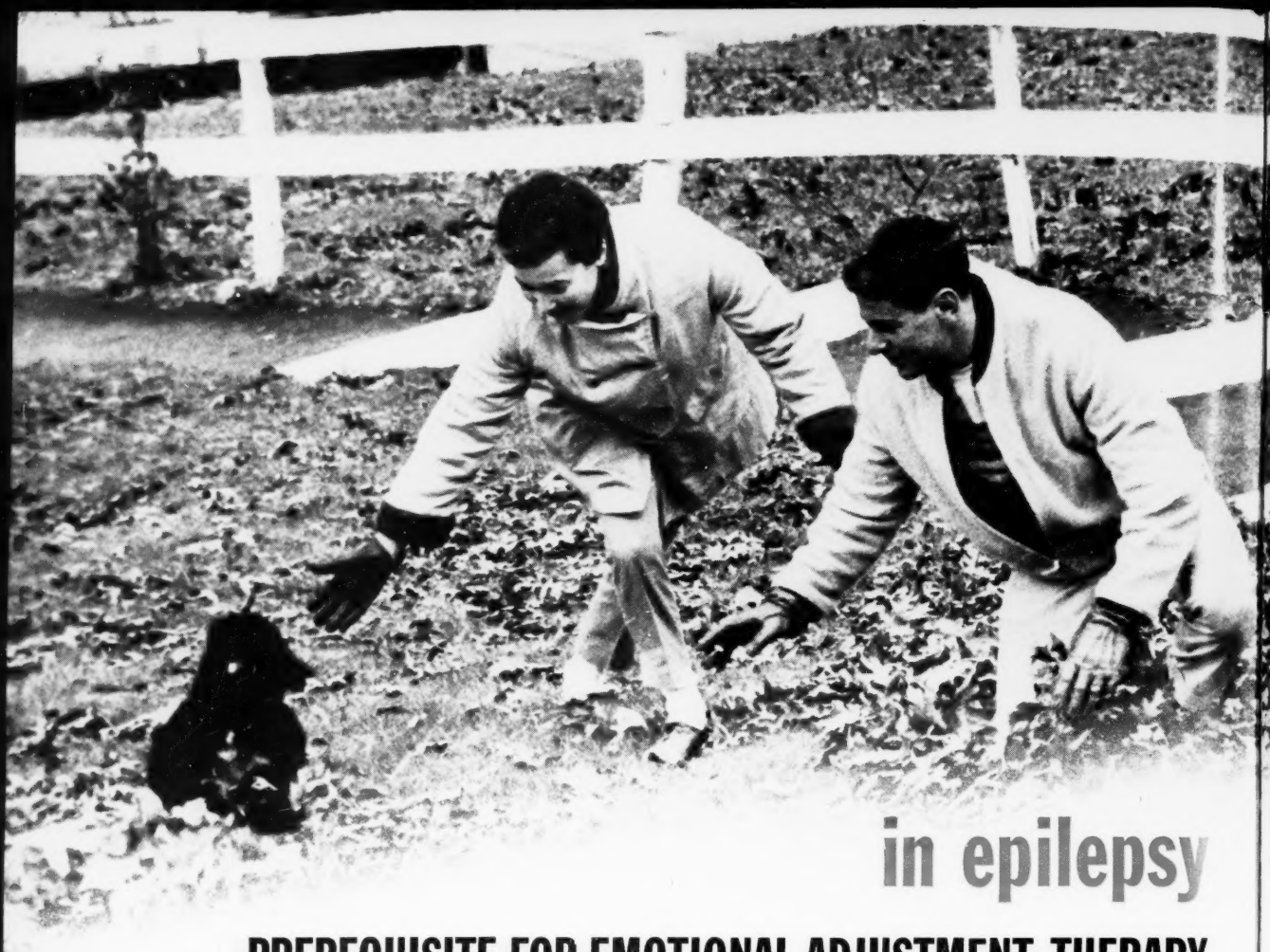

in epilepsy

PREREQUISITE FOR EMOTIONAL ADJUSTMENT: THERAPY

"The most effective form of psychotherapy is to demonstrate to the patient that his seizures can be adequately controlled by the use of anticonvulsant medication."[1]

REQUISITE FOR THERAPY:
THE PARKE-DAVIS FAMILY OF ANTICONVULSANTS

effective anticonvulsants for most clinical needs

bibliography: (1) Carter, S. M.: *M. Clin. North America:* **315** (March) 1953. (2) Chao, D. H.: *Ibid.*, p. 465. (3) Goodman, L. S., & Gilman, A.: The Pharmacological Basis of Therapeutics, ed. 2, New York, MacMillan Company, 1955, p. 187. (4) Davidson, D. T., Jr., in Conn, H. F.: Current Therapy 1958, Philadelphia, W. B. Saunders Company, 1958, p. 568. (5) Zimmerman, F. T.: *New York J. Med.* **55**:2338, 1955. (6) French, E. G.; Rey-Bellet, J., & Lennox, W. G.: *New England J. Med.* **258**:892 (May 1) 1958.

FOR CONTROL OF GRAND MAL AND PSYCHOMOTOR SEIZURES

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"...DILANTIN Sodium is the most useful nonsedative anticonvulsant."[2]

"Coincident with the decrease in seizures there occurs improvement in intellectual performance. Salutary effects of the drug on personality, memory, mood, cooperativeness, emotional stability, amenability to discipline . . . are also observed, sometimes independently of seizure control."[3]

The drug of choice for control of grand mal and of psychomotor seizures, DILANTIN Sodium (diphenylhydantoin sodium, Parke-Davis) is supplied in many forms including Kapseals of 0.03 Gm. and of 0.1 Gm., in bottles of 100 and 1,000.

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After five years of study, using MILONTIN in a series of 200 patients with petit mal epilepsy, one investigator reports: "Results confirm our previously published data on a smaller number of cases and show that MILONTIN is an effective agent for the treatment of petit mal epilepsy . . . relatively free from untoward side effects."[5]

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In a recent study, 76 patients were treated with CELONTIN for periods up to two years. Included in this group were 34 patients with psychomotor seizures, 29 with petit mal, and 13 with other types. Forty per cent had marked benefit with CELONTIN (less than half their previous number of seizures), and all but 35 per cent experienced some degree of improvement. Marked benefit was obtained in 55 per cent of patients with petit mal and in 33 per cent of those having psychomotor seizures.[6]

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THE JOURNAL
of the
KANSAS MEDICAL SOCIETY

Volume LX MAY 15, 1959 Number 6

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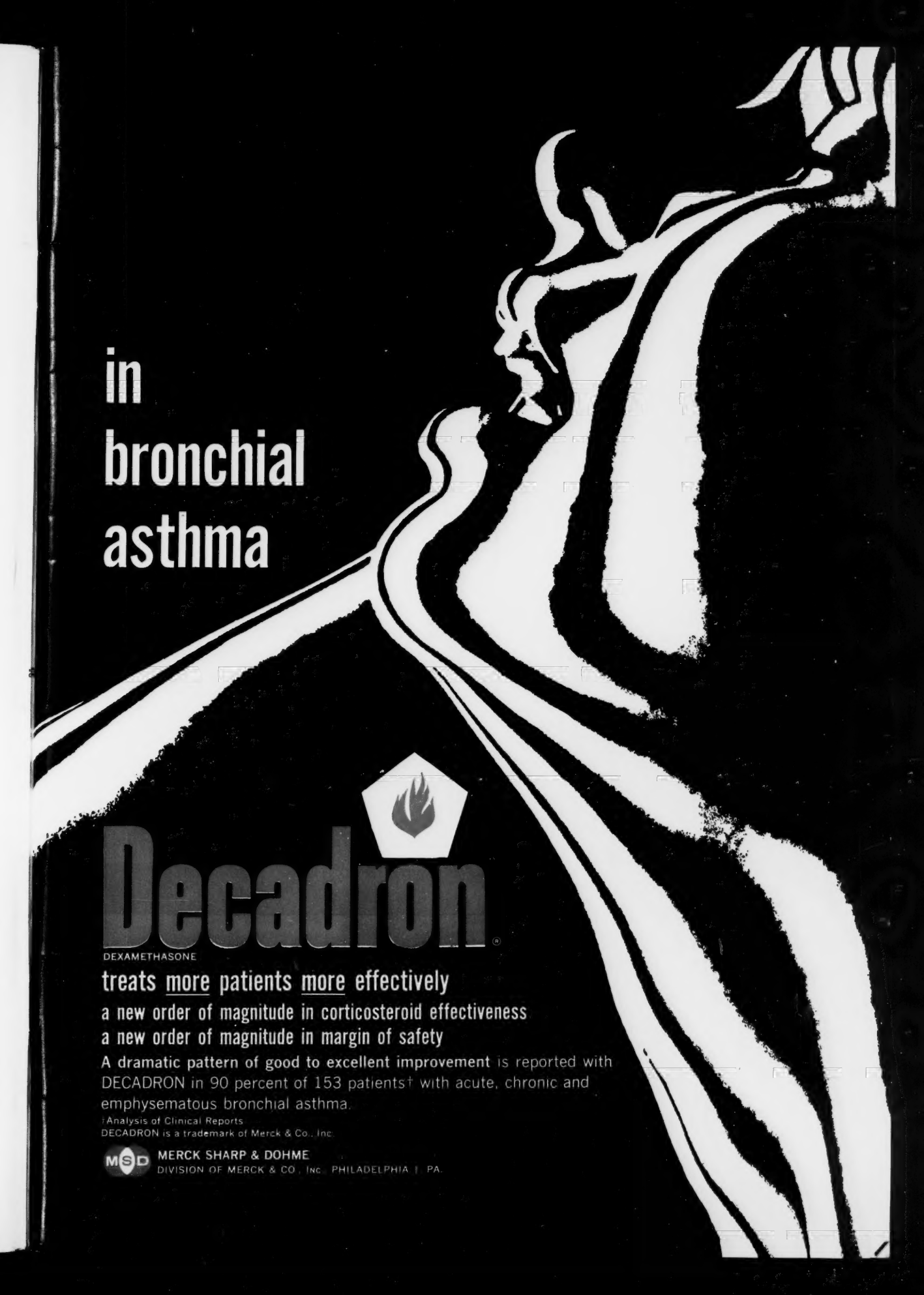
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RESEARCH:

key to Kent's popularity

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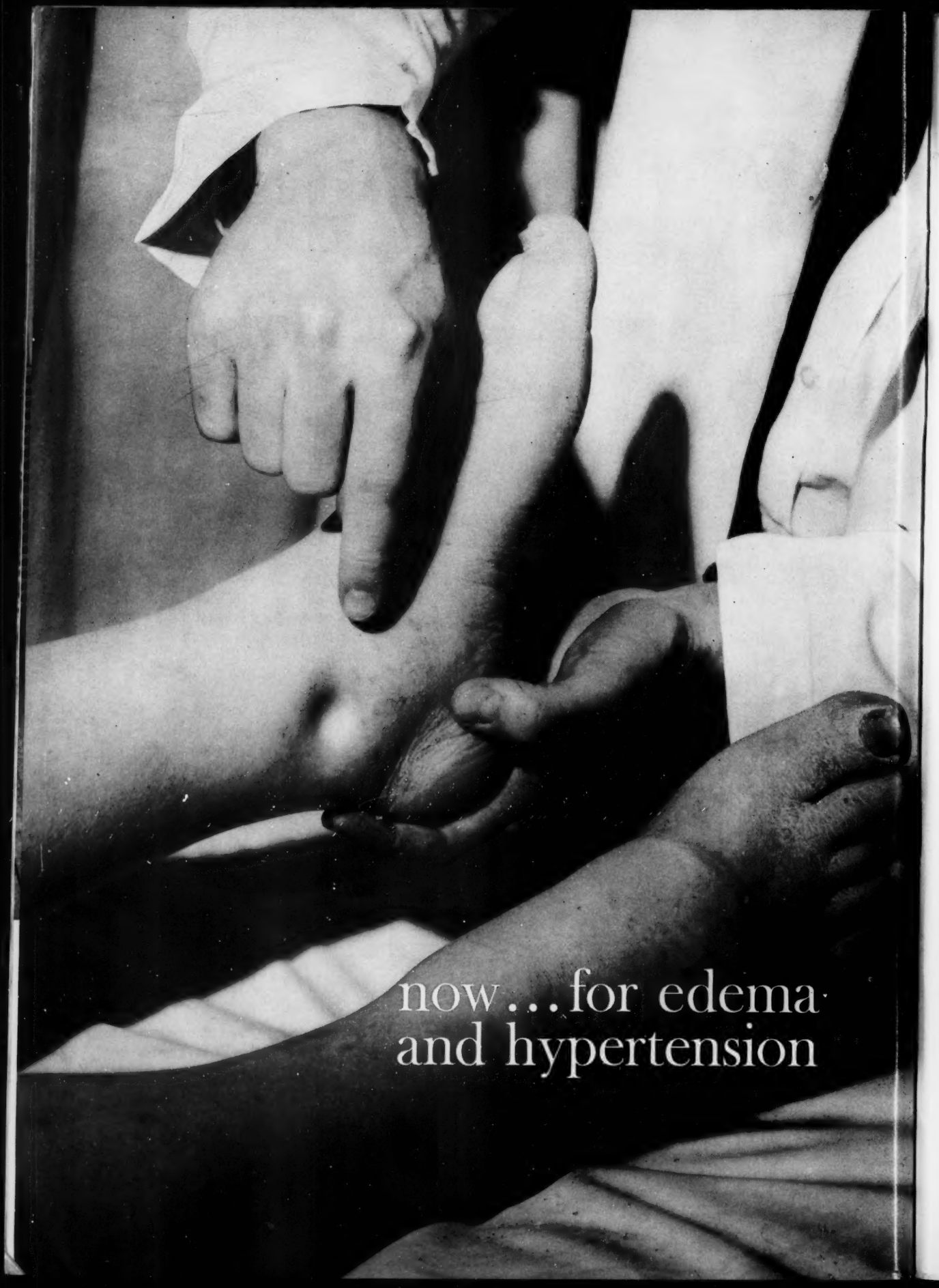
Behind this popularity is a story of months and years of research, perfecting the remarkable combination of filter action and flavor found in today's Kent cigarette. In developing Kent, Lorillard research scientists recognized that smokers wanted, on the one hand, a really satisfying taste; on the other, reduced tars and nicotine. In addition, smokers demanded a free and easy draw.

These, then, were the objectives. The first scientific breakthrough in the project was the development of the exclusive Micronite filter, patented by Lorillard. This filter was created because of newly-discovered principles in the field of filtration, which have been previously described in these pages.

Though this filter satisfied everyone on its ability to reduce tars and nicotine to the lowest level among the largest selling brands, there was still work to be done in the areas of taste and draw. After additional months of research, a new tobacco blend was developed which delivered rich taste *after* the smoke had passed through the filter. Next in the series of laboratory triumphs was a method of improving the draw to compare with the most free-drawing of all filter brands.

The rest of the Kent story is a legend in the tobacco industry. Outside, independent research studies confirmed the fact that Kent had achieved its objectives. Smokers responded. In fact, during the past year, more smokers changed to Kent than to any other cigarette in America.

A Product of P. Lorillard Company—First with the finest cigarettes—through Lorillard Research!


now...for edema
and hypertension

See case history of this patient on following pages.

highest fluid yields,
lowest blood-pressure levels
yet achieved with oral
diuretic-antihypertensive
therapy...

Esidrix T.M.

(hydrochlorothiazide CIBA)

2/2683HK-1

Record of patient with congestive failure, treated at a leading Philadelphia hospital. Photos used with permission of the patient.

marked pitting edema (4+) cleared in 4 days with Esidrix

ESIDRIX IS 10 TO 15 TIMES MORE ACTIVE THAN CHLOROTHIAZIDE

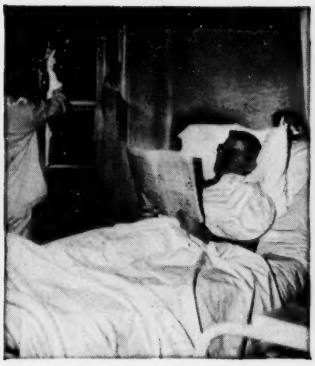
INDICATED IN... congestive heart failure • hypertension • hypertensive vascular disease • premenstrual edema • toxemia of pregnancy • edema of pregnancy • steroid-induced edema • nephrosis • nephritis

DOSAGE: Esidrix is administered orally in an average dose of 75 to 100 mg. daily, with a range of 25 to 200 mg. A single dose may be given in the morning or tablets may be administered 2 or 3 times a day.

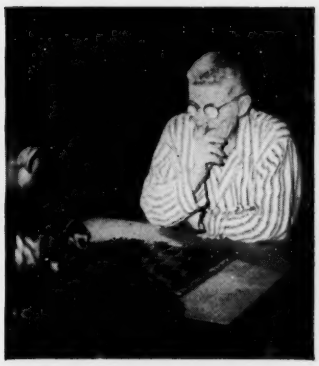
SUPPLIED:
Tablets, 25 mg. (pink, scored); bottles of 100 and 1000. *Tablets,* 50 mg. (yellow, scored); bottles of 100 and 1000.

CIBA
SUMMIT N. J.

L.S., 81-year-old patient with complaint of painless hematuria admitted to hospital on 3/3/59. Past history included congestive heart failure of 15 years' duration. **Clinically significant symptoms:** expiratory wheezes over entire chest; bilateral coarse rales of both bases; slight abdominal distention (without evidence of ascites); palpable liver 2-3 fingerbreadths below rib cage; bilateral pitting edema (4+) of pretibial and ankle area. **Admission diagnosis:** hematuria of unknown origin; arteriosclerotic cardiovascular disease; poorly compensated heart failure; and chronic pulmonary fibrosis with pulmonary insufficiency.



Patient was put on regimen of bed rest, moderate salt restriction, digitalis and pulmonary decongestants. When ankle edema, hepatic congestion and rales failed to clear by 3/6, Esidrix 50 mg. b.i.d. was ordered. By 3/8 L.S. had lost 3 pounds. Rales decreased; there was 1+ pitting edema of ankle area only. He felt more comfortable, was able to enjoy reading newspapers and magazines in bed.



By 3/11, patient's weight had dropped 2 more pounds. Ankle edema and lung rales were gone. Patient tolerated cystoscopy and fulguration of a small bleeding polyp in his bladder on 3/12 very well. Ambulatory on the 4th day of Esidrix therapy, L.S. visited his neighbors down the hall, played checkers with another patient. On 3/14 he was discharged.

Patient L.S. Date	3/4	3/5	3/6	3/7	3/8	3/9	3/10	3/11	3/12	3/13
Urinary Output (ml.)	840	690	960	2140	1230	660	1220	1350	--	--
Weight (lbs.)	139	--	--	--	136	--	--	134	--	--
Esidrix Dosage (mg./day)	0	0	50	100	100	100	100	100	50	100

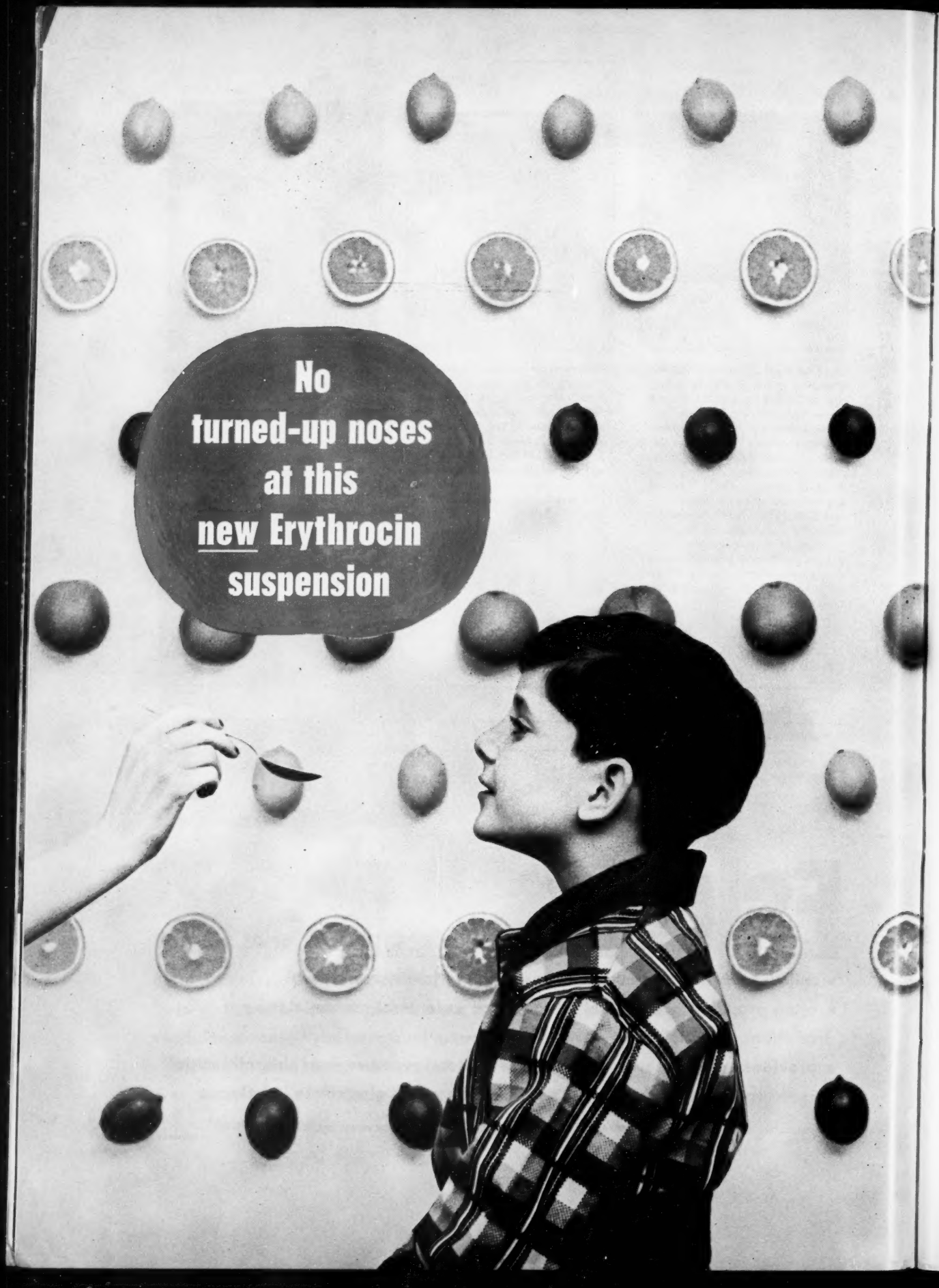
Esidrix T.M.

(hydrochlorothiazide CIBA)

- **relieves edema in many patients refractory to other diuretics[1]**
- **often produces greater weight loss than parenteral mercurials or chlorothiazide[2]**
- **provides a greater average reduction in blood pressure than chlorothiazide[3]**
- **is exceptionally safe . . . reduces the likelihood of electrolyte imbalance**

1. Brest, A. N., and Likoff, W.: Am. J. Cardiol. *3*:144 (Feb.) 1959. 2. Clark, G. M.: Clinical report to CIBA.
3. Dennis, E. W.: Clinical report to CIBA.

8/2684MK-2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at this
new Erythrocin
suspension

a new derivative of Erythromycin designed especially for children

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ORAL SUSPENSION

Never a flavor like this in an antibiotic suspension. A new achievement in pharmaceutical elegance—a ready-mixed, stable suspension so sweet and good you can't tell it's "medicine."

No bitterness, no unpleasant aftertaste—just pure, sweet citrus flavor.

Never an antibiotic better proved against everyday coccal infections. After millions of prescriptions, an unparalleled safety record.

High, peak blood levels within one hour—plus nearly 100% effectiveness against coccal infections. And, unlike broad-spectrum antibiotics, ERYTHROCIN is classed as a bactericidal agent.

Indications: Against staph-, strep- and pneumococci. Especially useful when patients are allergic to penicillin or other antibiotics. **Dosage:** For children, 30 mg./Kg. per day. Adults, 1 to 2 Gm., depending on severity of infection. **Supplied:** In 60-cc., pour-lip bottles. Each 5-cc. teaspoonful represents 200 mg. of Erythrocin. Abbott

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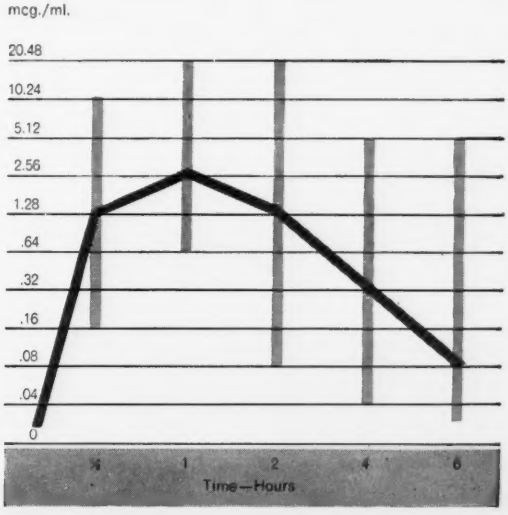
Range of blood levels obtained from one dose of 400 mg. ERYTHROCIN SUSPENSION. Medication was administered to 30 volunteer adults, and represents a dosage of approximately 6 mg./Kg. Bars show ranges —continuous line indicates medians.



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Combines the anti-inflammatory effect of hydrocortisone with the comprehensive bactericidal action of the antibiotics.

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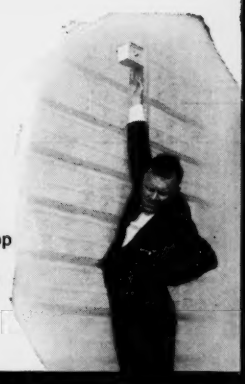
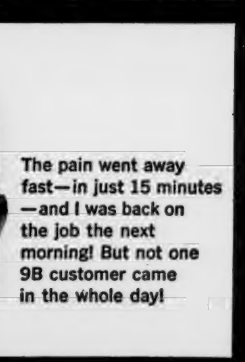
REACHING FOR THOSE 9B's NEARLY PUT ME ON THE SHELF...



Reaching for 9B shoes and other top shelf sizes is no joke . . . it gave me a terrible kink in my back.

Before the day was over, I could hardly stoop to push a shoehorn.

I called my doctor that night and picked up the tablets he prescribed.



The pain went away fast—in just 15 minutes—and I was back on the job the next morning! But not one 9B customer came in the whole day!

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Salts of Dihydrohydroxycodeinone and Homatropine, plus APC

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ACTS FASTER — usually within 5-15 minutes. **LASTS LONGER** — usually 6 hours or more. **MORE THOROUGH RELIEF** — permits uninterrupted sleep through the night. **RARELY CONSTIPATES** — excellent for chronic or bedridden patients. **VERSATILE** — new "demi" strength permits dosage flexibility to meet each patient's specific needs. PERCODAN-DEMI provides the PERCODAN formula with one-half the amount of salts of dihydrohydroxycodeinone and homatropine.

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AND THE PAIN WENT AWAY FAST

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Richmond Hill 18, New York

*U.S. Pat. 2,628,185

"It is concluded that the addition of buffering agents to acetylsalicylic acid in the concentrations used serves no clinically detectable useful purpose."[1]

[1]Sadove, Max S. and Schwartz, Lester: An Evaluation of Buffered Versus Nonbuffered Acetylsalicylic Acid, Postgraduate Medicine; 24:183, August, 1958.

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orange flavored, 2 oz. bottle, 125 mg. per teaspoonful (5 cc.)

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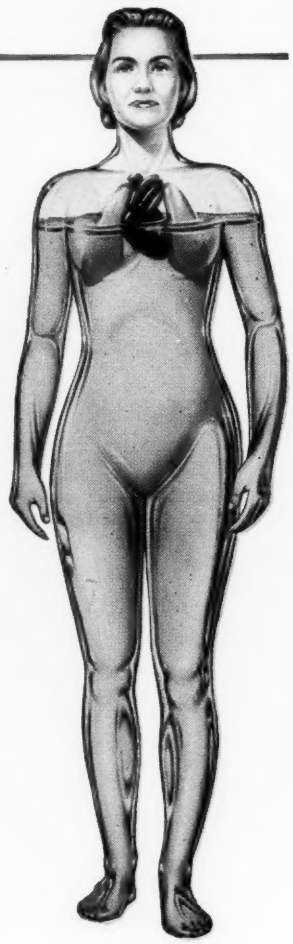

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- often achieves the benefits of a low salt diet without the unpleasant restriction

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In hypertension—one or two 25 mg. tablets or one 50 mg. tablet HYDRODIURIL once or twice a day.

supplied: 25 mg. and 50 mg. scored tablets HYDRODIURIL (Hydrochlorothiazide) in bottles of 100 and 1,000.

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Additional information on HYDRODIURIL is available to the physician on request.

bibliography: 1. Esch, A. F., Wilson, I. M. and Freis, E. D.: 3,4-Dihydrochlorothiazide: Clinical Evaluation of a New Saluretic Agent. Preliminary Report; M. Ann. District of Columbia **28**:9, (Jan.) 1959. 2. Ford, R. V.: The Clinical Pharmacology of Hydrochlorothiazide; Southern Med. J. **52**:40, (Jan.) 1959. 3. Fuchs, M., Bodi, T., Irie, S. and Moyer, J. H.: Preliminary Evaluation of Hydrochlorothiazide ('HYDRODIURIL'); M. Rec. & Ann. **51**:872, (Dec.) 1958. 4. Moyer, J. H., Fuchs, M., Irie, S. and Bodi, T.: Some Observations on the Pharmacology of Hydrochlorothiazide; Am. J. Cardiol. **3**:113, (Jan.) 1959.

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- qualitatively similar to DIURIL® but at least 10 to 12 times more potent by weight
- loss of potassium is clinically insignificant in the great majority of patients on normal diets

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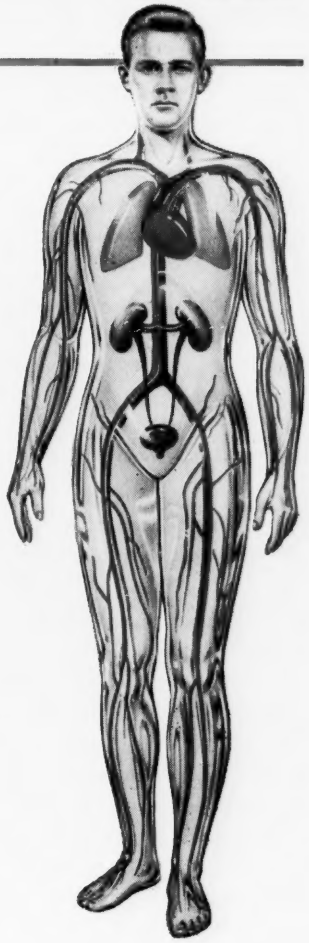
NEW RELEASE

IN HYPERTENSION:

- effective by itself in some patients—markedly potentiates other antihypertensive agents
- provides background therapy to improve and simplify the management of all grades of hypertension
- has been reported by some investigators to have a greater antihypertensive effect in some patients than chlorothiazide at equivalent dosage
- does not lower blood pressure in normotensives
- reduces dosage requirements for other antihypertensive agents, often with concomitant reduction in their distressing side effects
- smooths out blood pressure fluctuations



precautions: It is important that the dosage be adjusted as frequently as the needs of the individual patient demand. When HYDRODIURIL is used with a ganglion blocking agent, it is mandatory to reduce the dose of the latter by at least 50 per cent, immediately upon adding HYDRODIURIL to the regimen.

HYDRODIURIL has shown no adverse effects on renal function; for this reason it may be used with excellent results even in patients for whom the organomercurials are contraindicated because of renal damage.

The excretion of potassium is much lower than that of sodium or chloride and, as is the case with DIURIL®, the loss of potassium is clinically insignificant in the great majority of patients on normal diets. If indicated, potassium loss may easily be replaced by including potassium-rich foods in the diet (orange juice, bananas, etc.).

MSD

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HIGHLIGHTS FROM THE A.M.A. COUNCIL ON DRUGS

REPORT ON TRIAMCINOLONE

J.A.M.A. 169:257 (January 17) 1959.

"It [triamcinolone] has an anti-inflammatory potency greater than an equal amount of prednisolone; i.e., comparable suppressive effects may usually be achieved with lower doses of triamcinolone than with prednisolone."

"Triamcinolone lacks the sodium-retaining and edema-producing effects of most other glucocorticoids. During the first several days of administration, it may cause a loss of sodium from the body; an initial mild diuretic action is frequently observed, whether the patient is frankly edematous or not. This is in contrast to the definite sodium-retaining and fluid-retaining properties of cortisone and hydrocortisone and to a much lesser extent with prednisone and prednisolone."

"Except in exceedingly large doses, triamcinolone apparently has no consistent effect on potassium excretion. Hence, neither sodium restriction nor potassium supplementation is ordinarily required during therapy with this agent."

"As with other glucocorticoids, the long-term administration of triamcinolone results in definite catabolic effects, as indicated by impairment of carbohydrate utilization and negative protein and calcium balance. This catabolic effect, coupled with a lack of appetite stimulation which is apparently peculiar to triamcinolone, may produce weight loss that might be undesirable in some patients treated for long periods of time."

"...the voracious appetite, with weight gain and euphoria, characteristic of other steroids, is not seen with administration of triamcinolone."

"Triamcinolone has been used for the management of a wide variety of clinical conditions usually considered amenable to systemic steroid therapy. These have included rheumatoid arthritis and other collagen diseases, allergic and dermatological disorders, certain leukemias and malignant lymphomas, the nephrotic syndrome, pulmonary emphysema and fibrosis, acute bursitis, rheumatic fever, and certain blood dyscrasias. Although clinical experience with the drug in some of the foregoing conditions is not extensive, the many similarities in action between triamcinolone and other potent glucocorticoids would indicate a usefulness for triamcinolone akin to that of other agents of this class."

"There is some evidence that triamcinolone is more effective at a smaller dosage than are other steroids in controlling both the skin and joint lesions in psoriasis, whether or not complicated by arthropathy."

"Triamcinolone appears to compare favorably with other steroids for use in those situations in which edema and sodium retention have been complicating problems."

"It [triamcinolone] may also be the steroid of choice for patients in whom psychic stimulation, euphoria, voracious appetite, and weight gain should be avoided."

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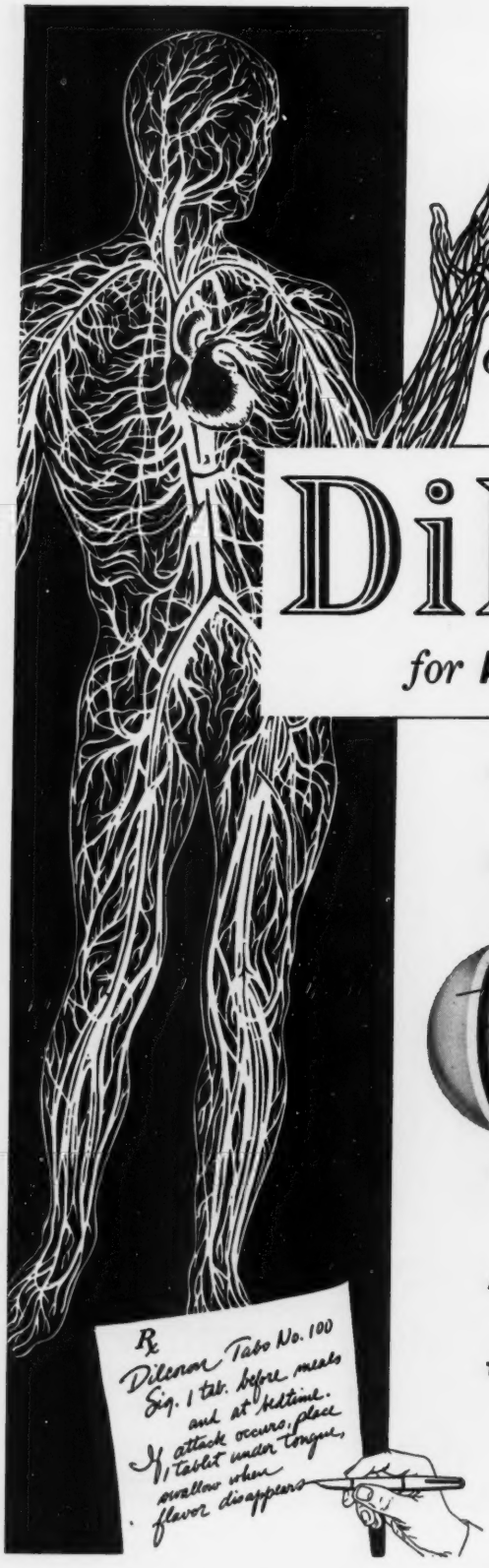

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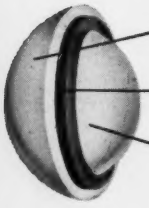

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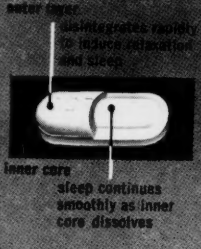

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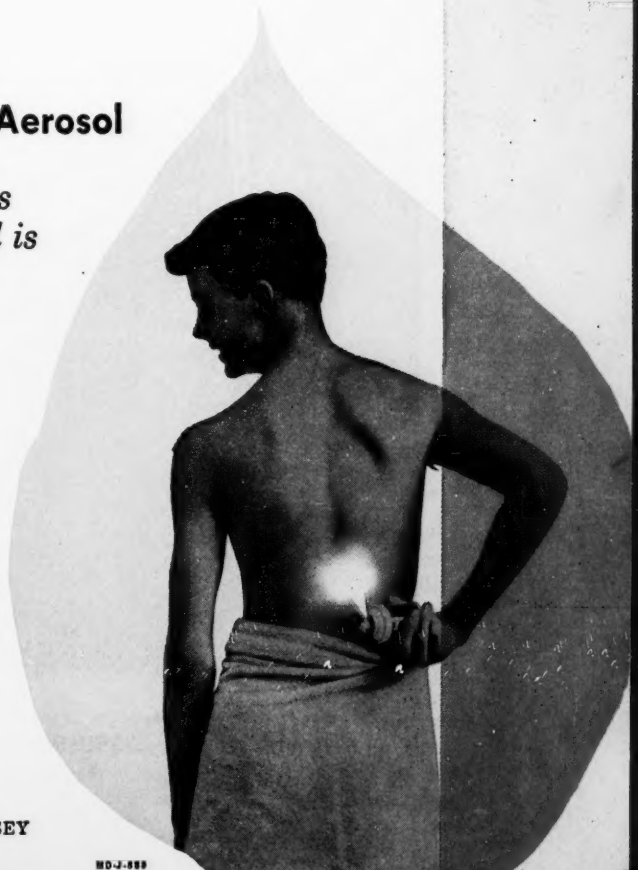

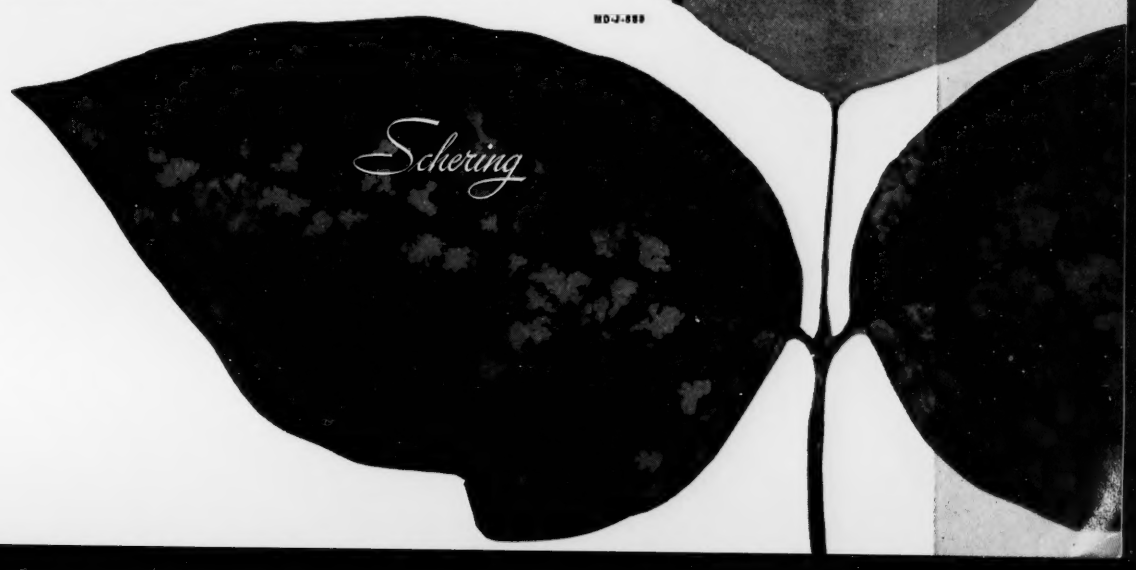

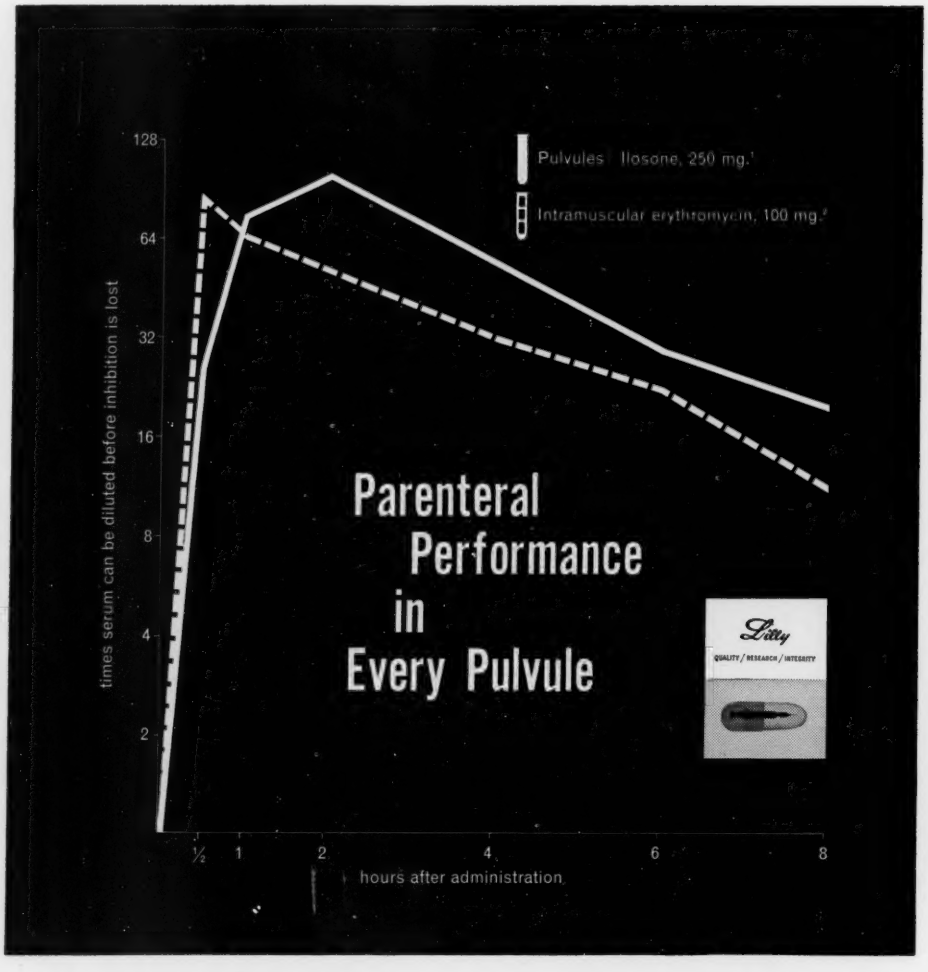

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1. Antibiotic Med. & Clin. Therapy, *5*:609, 1958.
2. Data from Antibiotics Annual, p. 269, 1954-1955.

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Volume LX **MAY 15, 1959** **No. 6**

Fractures and GP's

Some Problems Encountered in Fractures Seen in Everyday Practice

F. WALTER CARRUTHERS, M.D., ***Little Rock, Arkansas***

I am deeply grateful to you for the honor extended me to address the Kansas Medical Society. I shall endeavor to present to you, for your consideration, some problems in handling certain types of fractures, particularly fractures of the shaft of the long bones, Colles' fractures, certain types of fractures encountered in children, Pott's fracture with and without dislocation, and some other types seen in your everyday practices. I will also suggest to you the manner in which I have been able to deal with the different problems each presents.

The amount of time required for fractures to unite varies with the different bones involved. Therefore, in appraising a fracture from any standpoint, one must see more than the fracture itself. The time element required in certain number of weeks should and must be forgotten, for too often the surgeon, as well as the patient, thinks only in terms of six, eight or ten weeks. Most doctors have patience only to wait from one operation to another or from one application of the treatment he has selected for the patient to have time to get well. Too often we find ourselves lacking in that knowledge of common "horse sense" or, in this instance, "Orthopedic Instinct," and we are too prone to expect fractures to become united in four to six weeks. After that period of time, it is termined an "ununited fracture." The sooner we learn to forget the number of weeks required for a fracture to heal and cease thinking in terms of specified time, the sooner we will become better doctors in the treatment of fractures.

Remember that Tallyrand once said, "Be zealous; but don't be too damned zealous."

Again I would like to remind you of what Alonzo Clark said, "Don't treat your patients too much, let them get well if they can."

When one is called upon to treat a fracture of any kind he must first have the right conception of the manipulation that he expects to use, along with an adequate conception of the immobilization which he has in mind and thus be able, in the end, to direct all subsequent treatment of the patient to a successful recovery. This idea will certainly result in the successful treatment of any fracture that you may be called upon to treat and may avoid unnecessary operation.

A discussion of some of the difficulties encountered and ways in which they may be avoided or controlled; things to do and not to do, aimed at the physician in general practice.

Even under ideal conditions, there are many types of fractures that can and should be treated more successfully by certain internal fixation rather than simple manipulative procedures. We are all aware of the fact that most of us are too prone to want to do an open operation when, in all probability, the fracture can be treated successfully in the hands of a skilled manipulator by the so-called closed method. Always check carefully all x-rays and be sure of the fracture before and after reduction. I am reminded here of the feelings of a general practitioner who, on an occasion, remarked, "I was able to successfully treat fractures for over 40 years until, one day, a young upstart salesman came along and sold me some x-ray

Presented at Annual Meeting of the Kansas Medical Society, Kansas City, May 6, 1958.

equipment. Since then I have never been able to properly set a fracture." To this I have added—one must remember that the patient doesn't walk around on his x-rays.

One must naturally be possessed with a knowledge of bone surgery and must be in a position at all times to apply the additional sense of proper splinting and proper immobilization. All of this is based on the proper training necessary to apply the procedure one expects to use. Remember, it is not the splint but the man behind it.

Fractures are too individual, and the surgeon therefore must have at his command basic surgical principles, along with mechanical and other common sense ability in order to combat the many difficult, unseen and unexpected problems that may arise in any case. With the background of good mechanical sense, a familiarity of the proper principles of splinting, associated with good surgical training, one should, when required of him, be able to undertake the problem at hand, be it closed procedure or open operation, with more or less impunity.

With our present day knowledge of asepsis, surgical technique, and operative preparation one should not avoid an open operation if it be required. I am not unmindful of the fact that the general surgeon or practitioner not accustomed to doing bone surgery should be warned against attempting to operate fractures without a thorough knowledge of the procedure he is endeavoring to undertake.

I am sure, however, that a skillful technique will permit a trained operator to apply the method necessary in doing an open operation. The principle of sound fixation in fracture treatment is obtained in most cases by suitable traction and fixation.

Not infrequently, however, some type of internal fixation may be required, although the application of it should not be classified or recommended as a panacea for fracture treatment, but merely as a mechanical procedure often necessary in carrying out a principle of good fixation.

Fractures not properly reduced and certain types of comminuted and oblique fractures can be treated better, in many instances, with the fragments held in a secured and fixed position, by the certain internal fixations, combined with adequate external fixation of plaster or special splints.

There are no definite rules. In other words, one should use the method with which he is most familiar, and the technique which produces the best results in his own hands. Never treat an open reduction of any kind as a simple procedure. There is none in my experience which requires better judgment and more perfect technique. Do not be too prone to criticize unless you have tested the method in question. Mature judgment and the results of long experience are necessary to determine, without trial, which fracture will have to be opened for proper fixation and which may, or can be, reduced and maintained without an open operation.

Non-union occurs in some cases regardless of what is done, yet in a majority of cases it is due to improper fixation. Fixation is paramount and must be absolute and maintained over a sufficient period of time for union to occur.

The basis upon which all successful treatment of fractures has been founded is traction applied in some manner. If one elects the closed method for treatment of fractures of the shaft of the femora in a child, Russell traction should, in my opinion, be the treatment of choice except in the cases involving the extreme upper third of the femoral shaft. In this case, the overhead traction in which the limb is attached by Buck's extension to an overhead bar or frame, is desirable, with sufficient weight to overcome the shortening and angulation. In my opinion, this type of treatment has not received the general use it should.

It is my profound opinion that every general practitioner or surgeon treating fractures should have among his armamentarium a Russell traction outfit, a Thomas splint, and a Buck's extension equipment, and he should be well acquainted with their methods of application. They are simple, yet so effective. In children, their usefulness is unequaled, and they can be used in adult cases as well. The Thomas splint, the Bohler-Brauns splint and the Bryant traction are all worthwhile methods, especially in the treatment of fractures of the mid- and lower-shaft of the femora.

Colles' fractures have always been classified as simple fractures. Of this, I have never been convinced. I personally believe that these fractures are of the most severe type for a so-called simple fracture. They require as much manipulation and skill as one may be called upon to apply in the treatment of any fracture. They are simple only in differentiation from a compound fracture.

Pott's fractures of the ankle are likewise, in many instances, difficult to handle, particularly when associated with a severe dislocation. In most instances, this type of case requires certain internal fixation devices for successful treatment.

Fractures of the shaft of the forearm again present a most difficult type. In some instances, we can reduce these by closed reduction, by special traction device on a traction table, or by manipulation and cast. However, in some instances it is necessary to resort to open operation and internal fixation.

Fractures of the hip, namely, the intracapsular type, still present a difficult problem. I am inclined to follow the teachings of the late Kellog Speed. He classifies the intracapsular type fracture as an unsolved frac-

ture. Strides have been made towards solving its difficulties. Internal fixation gives the best results. Again it requires skill and certainly should not be attempted by an inexperienced operator.

Intertrochanteric fractures are an entirely different problem. Fortunately, the intertrochanteric is the most common. It is often looked upon as a fracture of the hip. This is not true. It is definitely a shaft fracture. Of the two, I frequently speak of them as the fortunate and unfortunate fractures. Obviously, fractures in the neck of the femora are unfortunate, while intertrochanteric fractures can be safely looked upon as a fortunate fracture. In many instances, this fracture can be successfully treated by a closed method of choice. In some cases, however, when resorting to operation, it avoids prolonged immobilization of the limb and bed rest.

Fractures of the humerus in the upper, middle and lower thirds can be treated successfully by the Caldwell method, or hanging cast, in most cases. The most common type of displacement with fractures of the mid shaft is lateral angulation just below the insertion of the deltoid and anterior angulation due to the bowstring effect of the triceps. The possibility of shortening can be controlled by the weight of the hanging cast. Therefore, in most instances, the closed reduction in this manner is the treatment of choice. Complications are less common in these closed methods than in the open methods which are sometimes necessary. For the first two weeks I have my patients sleep with a light weight attached to a wire hook incorporated into the elbow portion of the cast. Obviously, when up and about during the day the weight of the cast acts as the traction necessary for immobilization and fixation. If the fracture fails to unite, intramedullary nailing, and possibly bone grafting, is necessary.

Dr. Richard T. Hudson suggests the following "Don'ts" when using a hanging cast in treating fractures of the humerus:

Don't worry about some pain and crepitation the first week.

Don't worry that the fragments move.

Don't let the patient disturb the length of the support.

Don't apply too heavy a cast.

Don't neglect to see that the humerus hangs vertically.

Don't fail to make the patient ambulatory.

Don't fail to start circumduction exercises of the shoulder as soon as possible.

Don't fail to check with an x-ray after one week, with patient sitting or standing.

Don't expect the cast to reduce fractures of the surgical neck.

These methods, I hope, have helped to impress upon you the need for careful training, of the physician who assumes the responsibility for treatment of fractured bones. It is necessary, at times, to tell over and over again the same story, although our ideas may not always be in agreement. It is this difference in ideas and opinions that make for progress.

A drunk was walking along the curb with one foot on the sidewalk and the other in the gutter. A cop followed him for a couple of blocks, then caught up with him and said, "Come along, Buddy. I'll help you home. You're drunk." "Well thank God," said the drunk. "I thought I was crippled."

So in our general progress, the uses of metallic substances, developed during a period as recent as the past decade, play an important role in the operative fixation of fractures. These metallic substances include chromium, vanadium and vitallium and nickle steels.

There is probably no subject in the field of orthopedic surgery today so characterized by grave differences of opinion as the popularized operative applications of the different metallic gadgets for the operative fixation of fractures. A careful study of the literature on this subject covering the past two decades or more will familiarize one with the procedures which have been used and are used in many sections of the country. Personal discussion with many of the men who have been either for or against the uses of metallic substances has made it distinctly difficult to evaluate their uses.

It is my opinion that the suggestions here made will be found to be sound, logical and meet all of the basic mechanical requirements needed to restore fractures anatomically. If we remember that fractures which I have brought to your attention must be treated by those same principles which govern the treatment of fractures elsewhere; and too, if we remember that these injuries, serious as they sometimes are, can be greatly relieved or completely restored by the application of sound mechanical reasoning, a great deal of the apprehension felt by the surgeon and the patient can be entirely relieved.

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Transaminase*

Amounts in Cerebrospinal Fluid

HERBERT E. ARST, M.D.,** *Kansas City*

The level of glutamic oxaloacetic transaminase in the serum (S-GOT) of man has been well evaluated in recent years. The activity of the enzyme has been found to be elevated after acute myocardial infarction and hepatic cell necrosis.[1, 2, 3] This finding is of diagnostic and prognostic importance in these two conditions. The normal serum levels as established by Karmen, Wroblewski and LaDue through their spectrophotometric method[4] has been confirmed by many other investigators and found to range from 10 to 40 units.[1] Work with other enzymes, most notable of which are glutamic pyruvic transaminase (GPT)[5, 6] and lactic acid dehydrogenase (LDH),[7] is now in progress and appears to indicate promise of improved diagnostic methods.

As compared with the literature concerning serum glutamic oxaloacetic transaminase (S-GOT), very little has been published concerning the levels of this enzyme in the cerebral spinal fluid (CSF-GOT) of man. The normal range of activity of CSF-GOT has not been definitely established.

The brain contains the third largest amount of GOT per gram of dry weight of all body tissues. The heart and skeletal muscle contain more, and the liver slightly less of the enzyme.[8] In spite of this fact, most investigators find that there is little if any significant elevation of GOT in the serum of patients demonstrating central nervous system disease.

Siekert and Fleisher[9] found that of 52 patients with various neurologic disorders, only those with progressive muscular dystrophy, polymyositis and dermatomyositis showed elevations of GOT activity in the serum. Progressive muscular atrophy, myasthenia gravis, neuritis and nerve section were not associated with elevations of S-GOT activity. Unfortunately, CSF-GOT determinations were not reported in this series.

Chinsky[1] found four of five patients with cerebral vascular accidents had normal S-GOT levels. The fifth patient had a high S-GOT value and exhibited at autopsy an area of massive cerebral encephalomalacia. This patient had no abnormality of heart or liver tissue. Unfortunately, there were no determinations of the enzyme in the cerebral spinal fluid in these patients.

In a later report by Chinsky and Sherry,[10] 15 patients with acute cerebral vascular accidents were studied. In 13 of these the S-GOT was normal. The remaining 2 cases were the only ones to die and exhibited at autopsy massive areas of encephalomalacia.

A study of the level of transaminase found in cerebrospinal fluid in several diseases involving the central nervous system with a view of determining its prognostic value.

In both cases the S-GOT levels were elevated (64 and 570 units). Six patients had lumbar punctures 24 hours following the onset of their cerebral symptoms and values of 6, 13, 14, 16, 23 and 44 units were found in the spinal fluid. Serum assays revealed levels of 12, 33, 36, 37, 33 and 64 units respectively. The value of 44 in the cerebral spinal fluid in the patient with 64 units in the serum is considered to be an elevated value for the spinal fluid, as will be seen later.

The authors also evaluated a "control group" of eight patients and found values of 12 and 14 GOT units in the spinal fluid in two patients with grand mal epilepsy, 14 in a patient with obstructive jaundice, 15 with Bell's palsy, 20 with psychoneurosis, 22 with metastatic brain carcinoma, 36 with meningitis and 36 in a patient with a positive blood serology.

The latter two values will be considered to be elevated in the light of the report to follow. Chinsky and Sherry concluded that significant liberation of transaminase into the spinal fluid does not occur in the 24-hour period following a cerebral vascular accident.

According to LaDue, Wroblewski and Karmen[11] a "blood-brain barrier" to the transaminase enzyme exists so that with central nervous system necrosis there is little if any significant elevation of this enzyme in the blood. To explain the normal serum levels of transaminase in Chinsky's series, one may postulate the attractive, blood-brain barrier theory or consider the great dilution that may occur as the

* This study was made possible by a grant from the Institute of Medical Education and Research (under the direction of John W. Berry, M.D., Assistant Professor, St. Louis University School of Medicine, and Chief, Unit II Medicine) St. Louis City Hospital, St. Louis, Missouri.

** Assistant Resident in Medicine, St. Louis University service (Unit II) St. Louis City Hospital, St. Louis, Missouri.

necrotic transaminase containing material is released from a relatively small volume of cerebral spinal fluid (120 cc) into a much larger volume of circulating blood (5,000 cc).

Neither theory, however, can explain the elevated serum levels found in the two patients with large areas of encephalomalacia. In these patients perhaps the blood-brain barrier threshold was exceeded, or probably the transaminase is absorbed directly into the circulation as it is after myocardial infarction, thereby giving a significant elevation of the enzyme in the serum.

In smaller cerebral infarcts, perhaps there is absorption of the enzyme into the spinal fluid and subsequently into the systemic circulation resulting only in minor elevations in the serum. Thus, abnormally high serum levels will not be reached due to the dilution factor previously hypothesized. Elevated levels in the CSF exist no matter which explanation is accepted.

In a report by Wakim and Fleisher[12] on the effects of experimental cerebral infarction on transaminase activity in spinal fluid, serum and infarcted tissue, it was found that injecting vinyl acetate into the internal carotid artery of dogs leads invariably to increased activity of GOT in the cerebral spinal fluid (average 733 per cent of pre-infarction values). A peak activity is obtained in the spinal fluid at 100 hours after infarction. After this time the transaminase activity gradually decreases but remains above pre-infarction levels as long as two weeks. The level of CSF-GOT was proportional to the size of the infarct. Usually a relatively slight increase of GOT was found in the serum (average 110 per cent of pre-infarction values). These values, however, still remained well within normal range. Although elevations of the transaminase enzyme in the spinal fluid were constant findings, in the serum they were quite inconstant. The serum level was not proportional to the severity and extent of the infarct as is the level in the spinal fluid. The elevations of this enzyme in the spinal fluid always preceded any rise in the serum.

Analysis of the infarcted brain tissue revealed a loss of over 80 per cent of its original transaminase content, a finding quite similar to that produced after experimental myocardial infarction.[3, 5]

Wakim and Fleisher[12] found that GOT activity in the cerebral spinal fluid of dogs averaged slightly more than half that in the serum. Green et al.[13] came to a similar conclusion in their study of normal human controls.

Thus far, the effects of elevations of CSF-GOT on serum levels have been discussed. The question now arises as to what effects, if any, elevations of S-GOT have on CSF-GOT. To answer this the report of Fleisher and Wakim[14] is of value. Injections of transaminase concentrates into the cerebral spinal fluid significantly increased the level in this fluid as expected but did not alter the level in the serum. When experimental carbon tetrachloride poisoning occurred in dogs, resulting in hepatocellular necrosis, greatly increased elevations of both GOT and GPT in the serum occurred. However, only slight increases in the cerebral spinal fluid were noted.

The conclusion of these investigators was that little, if any, transfer of GOT or GPT occurs between serum and cerebral spinal fluid. This conclusion substantiates the blood-brain barrier theory of LaDue, Wroblewsky and Karmen.[11]

In order to determine the effect of elevations of S-GOT on CSF-GOT activity, a patient suffering from infectious hepatitis was studied. Simultaneous venepuncture and lumbar puncture were done. A level of 1,500 units GOT was found in the serum, but only 9 units in the spinal fluid could be detected. This value of 9 is well within the normal range for GOT in the cerebral spinal fluid. This finding substantiates the "blood-brain barrier" theory. Incidentally, this patient's urine contained only 1 GOT unit at the time the above procedures were done. This is in accordance with Chinsky's findings that the bulk of GOT is not excreted in the urine.

It is the purpose of the following report to establish the normal range of CSF-GOT values in man, and because a blood-brain barrier appears to exist and the brain being so rich in transaminase, it is felt that determinations of this enzyme in the spinal fluid rather than in the serum would be a more sensitive index of central nervous system necrosis, as has been established experimentally by the work of Wakim and Fleisher.[12] Various neurological disorders will be considered with special reference to central nervous system disease, especially cerebral vascular accidents.

Materials and Methods

The method of determination of GOT is a colorimetric one devised by Reitman and Frankel.[15] All reagents were supplied by the Sigma Chemical Company.* It is not the purpose of this report to describe this method in detail. The reaction involving aspartic acid and alpha-ketoglutaric acid was carried out at 40° C. incubation using a 0.2 ml. sample of the material to be tested. The oxaloacetic acid formed was reacted with 2-4 dinitro-phenylhydrazine to form a hydrazone complex, the color of which deepened

* The details of the procedure may be obtained by writing this company (3500 DeKalb Street, St. Louis, Missiouri). Request: Technical Bulletin No. 505, March 1957, "A Simplified Method for the Determination of Serum Transaminase."

with the addition of 0.4 N. sodium hydroxide. A reading was obtained in the Coleman Junior Spectrophotometer at 505 mμ. A control was used with each specimen determination as was suggested by Reitman and Frankel. Cerebral spinal fluid values were determined by exactly the same procedure as were those of the sera. The sera and spinal fluids were sent to the laboratory by the house staff of the St. Louis City Hospital for routine analysis. All spinal fluids were centrifuged and thereby separated from any cells present, prior to determination. This was done to avoid false high readings caused by the red cells which are rich in transaminase. For this reason no xanthochromic fluid was accepted for assay. Spinal fluid samples were refrigerated immediately for analysis a few days later.

Two hundred seventy-one spinal fluid determinations were made on 265 patients. These were divided into two major groups:

1. Those patients considered not to have neurological disease, herein called the normal group.
2. Those patients considered to have neurological disease, herein called the neurological disease group.

Each patient was carefully evaluated before being classified in either of these groups. Both groups were subdivided into two separate classes as follows:

1. The Normal Group—175 cases and determinations:
   a. Operating room patients 133
   b. Ward patients found not to have central nervous system disease 42
2. The Neurological Group—96 determinations, 90 cases:
   a. Cerebral vascular accident class — 27 determinations, 24 patients
   b. Non-cerebral vascular accident class ..... — 69 determinations, 66 patients

Results

Samples from 133 control cases were taken in the operating room at the time of lumbar puncture just prior to the injection of spinal anesthesia. Values ranged from 0 to 39 units with 90 per cent of them falling within a range of 5 to 25 units. One value of 58 units was not used in this statistical analysis since it was found to be far out of range with the rest of the group. The mean for this group was 14.0 units with a standard deviation of 6.6 units. Taking twice this deviation, the range from the control patients was calculated to be from 0.8 to 27.2 units.

Also within the control group were 42 patients from the wards considered to be free of central nervous system disease. Lumbar punctures from these patients showed a range of GOT activity from 0 to 24 units with 80 per cent of them falling between 5 to 19 units. The mean was calculated to be 13.1 with a standard deviation of 5.3. Twice this deviation would be 10.6 units. When using this value for determination of the range of this group, 2.5 to 23.7 was found.

As observed, there is no statistical difference between these two normal subgroups. Thus, one may combine both to calculate the total mean and normal range. For the mean 13.8 was found with a standard deviation of 6.3. The normal range for CSF-GOT would be 1.2 to 26.4 or approximately 1 to 25 units.

Within the neurological disease group are patients with cerebral vascular accidents. Twenty-seven determinations were made on 24 patients. One patient had four separate CSF-GOT determinations over a period of two weeks at roughly four-day intervals. These values were 18, 15, 11 and 15 units. Taking 25 units as the upper limit of normal as determined above in the control group, one can see that at no time was an elevation observed in this patient. The remaining 23 patients had one lumbar puncture each. Their values and time intervals (i.e., time of onset of symptoms to the time of lumbar puncture) is seen in Table 1.

TABLE 1

CSF-GOT VALUES ON CEREBRAL VASCULAR ACCIDENT PATIENTS

Case No.	*CSF-GOT*	*Time Interval*
1	23	6 hours
2	14	24 hours
3	29	24 hours
4	25	36 hours
5	30	2 days
6	13	3 days
7	11	3 days
8	9	3 days
9	13	3 days
10	38	3 days
11	13	4 days
12	33	7 days
13	33	7 days
14	16	10 days
15	18	10 days
16	35	14 days
17	13	3 years
18	4	Unknown
19	32	Unknown
20	15	Unknown
21	23	Unknown
22	13	Unknown
23	19	Unknown
24	18, 15, 11, 15 on same patient at 4-day intervals	

From the data presented in Table 1 there seems to be no relationship between the height of the GOT value and the time interval between the onset of cerebral symptoms and lumbar puncture. The 27 values, which include the four determinations on a single patient, range from 4 to 38 units with 85 per cent of them falling within a 10 to 34 range. The mean was found to be 19.7 units with a standard deviation of 9.0 units. The range was from 1.7 to 37.7.

In only eight of these 27 values, or 30 per cent were the CSF-GOT levels considered elevated (i.e., over 25 units). There is considerable overlap with the normal range even though the mean value is 6 units higher than the normal. There does not appear to be a significant difference with which to draw clinical conclusions in this series.

In Table 2 various central system disorders other than cerebral vascular accidents are shown. These consist of 69 determinations on 66 patients. There are 28 disease entities illustrated, the first eight of which contain more than 1 patient.

The values in this series range between 0 and 44 with almost 80 per cent of them falling within a range of 5 to 25 units. There were 6 values of 45 or above which were not included in this statistical analysis, as it is felt that these were too high to contribute to a true range in this series. The mean was calculated

TABLE 2

CSF-GOT VALUES ON PATIENTS WITH VARIOUS CENTRAL NERVOUS SYSTEM DISEASES OTHER THAN CEREBRAL VASCULAR ACCIDENTS

Diseases	*No. Cases*	*GOT Units*
1. Grand mal epilepsy	15	43, 38, 32, 24, 21, 20, 19, 15, 14, 13, 9, 8, 7, 7, 7
2. Central nervous system lues	10	25, 24, 21, 21, 13, 12, 9, 4, 0
One patient had 32 units which fell to 14 following adequate penicillin therapy over 2-week period.		
3. Schizophrenia	5	29, 18, 12, 10, 9
4. Chronic brain syndrome due to cerebral arteriosclerosis	4	16, 13, 11, 2
5. Parkinson's disease	4	43, 15, 21, 1
6. Hypertensive encephalopathy	2	18, 14
7. Undiagnosed central nervous system disease	3	50, 20, 13
One week following the determination of 50 units on a patient, a repeat lumbar puncture revealed a value of 45.		
8. Cerebral atrophy	4	60, 14, 13, 9
9. Cerebral cryptococcosis		84-10 days 115
10. Toxoplasmosis		73
11. Spinal cord tumor		41
12. Heat stroke		36
13. Delirium tremens		19
14. Menier's syndrome		16
15. Tic doloreau		15
16. Brain contusion		15
17. Diabetic neuropathy		14
18. Frontal skull fracture		12
19. Tuberculous meningitis		10
20. Subarachnoid hemorrhage		8
21. Intracerebral hematoma		8
22. Functional hypoglycemia		8
23. Basilar artery insufficiency		8
24. Encephalomalacia		8
25. Cerebellar atrophy		8
26. Acute poliomyelitis		7
27. Aseptic meningitis		6
28. Spinal cord degeneration		4

to be 15.5 with a standard deviation of 10.2 units. When using twice this deviation to determine the range, it was found to be 15.5 ± 20.6 or –5.1 to 36.1. Since no negative values may exist, 0 to 35 would be an approximate range for this abnormal group. This range overlaps considerably with the normal and is only 10 units higher than the upper limit of normal. Even the mean value of 15.5 as compared with that of the normal mean of 13.8 does not appear to show a statistically significant difference upon which to base clinical conclusions.

The 6 values above 45 units on 4 patients alluded to above and which were not included in the statistical analysis, deserve further comment. The patient with toxoplasmosis with a value of 73 had only one determination whereas the patient with cryptococcosis had 2 separate ones at 10-day intervals (values 84 and 115 units) during which time his course became progressively worse. The patient with undiagnosed disease of the central nervous system had 2 separate determinations (values 50 and 45 units) at one-week intervals. This patient was thought to be hysterical. The patient with the diagnosis of cerebral atrophy was thought to have Alzheimer's disease. The reason for the disproportionately high values of GOT in the 4 patients is open to speculation.

In all the cerebral spinal fluid samples so far discussed, no relationship between the protein level and the transaminase values could be found.

Discussion

When considering the normal range of CSF-GOT activity, a standard of reference must be used in order for these values to have meaning. The reference standard to be utilized shall be the familiar normal S-GOT mean and range.

In our laboratory the mean value for S-GOT is 21.2 units with a standard deviation of 8.5. The normal range, therefore (using twice the deviation), is 4.2 to 38.2. This range approximates that noted in the literature. In order for the reference standard to be valid the material and methods used for serum transaminase determinations must be exactly the same as that used for spinal fluid. This was done in the present series and that of Green and associates.[13]

The normal CSF-GOT range as established by the above authors in 15 patients was found to be 2 to 7 units with a mean of 5.0. These values are much lower than the 1 to 25 range (13.8 mean) determined in our series. The serum GOT range of 10 to 20 units used as a reference standard by Green[13] et al. is also much lower than that quoted in the literature and in our series.

Since the present series consists of a relatively large number of determinations and the serum values are consistent with that of the literature, it is felt that the range of 1 to 25 units is an accurate reflection of the CSF-GOT activity in normal individuals.

There is some contradiction between the data presented in our group of cerebral vascular accident patients and those in the available literature. In the present series only 8 out of 27 values were considered elevated (i.e., over 25 units), whereas in the series of Green and associates[13] 7 out of 11 patients showed significant changes in CSF-GOT activity.

In 1 patient no rise in GOT values was found in the present series after 4 separate determinations done at about four-day intervals immediately following his cardiovascular accident. In 1 of Green's patients, 5 determinations over approximately the same time interval showed a steady rise in CSF-GOT activity.

From the data in the present series it is thought that no relationship exists between the height of the GOT value and the time interval between onset of symptoms and lumbar puncture. This lack of correlation between time and height of CSF-GOT levels was not found in the series of Green and associates. On the contrary, their work showed a steady rise in activity over a two-week period, a finding consistent with that found experimentally by Wakin and Fleisher. However, these investigatiors found, in a more recent work, that the degree of rise in spinal fluid transaminase in the patient suffering from cardiovascular accident is much less pronounced and inconstant than that shown in their experimental work.

The range of activity in the cerebral vascular accident group is approximately 2 to 38 units. This range demonstrates considerable overlap with that of the normal and, therefore, is of little clinical significance. A mean difference of 6 units is also probably of little statistical difference.

In the 69 determinations on 66 patients with various central nervous system disorders there is a wide range of variation within each disease category and also between categories. Thus little clinical significance can be ascribed to these values except the 2 cases with cryptococcosis and toxoplasmosis where values were exceptionally high. One patient with heat stroke and another with spinal cord tumor showed elevations. Three out of 15 cases with epilepsy of the grand mal type showed elevations above 25 units. One out of 4 in each of the Parkinson's disease and cerebral atrophy groups showed elevations.

The total range of activity in these groups as compared to the normal is apparently not clinically significant because considerable overlap exists. There is no statistically significant difference when comparing the mean in each group (15.5 for the former and 13.8 for the latter).

In the report of Fleisher and associates[16] it was demonstrated that elevations of both GOT and LDH can occur in a number of neurologic diseases. Significant increases in GOT were found in both serum and spinal fluid of patients with cerebral vascular disease, head injury, degenerative disease of the central nervous system and convulsive disorders. In the latter 3 conditions, LDH was found to be higher. In the brain tumor group only S-GOT was significantly increased.

Summary

The value of S-GOT determinations in myocardial infarction and acute liver disease has been well established in recent years. It is felt by us that the determination of this enzyme in certain central nervous system disorders would be of value as a diagnostic measure. A review of the literature on this subject is presented.

Before a value of GOT in the CSF can be interpreted as being elevated, a normal range must be established. This has been done with lumbar punctures on 175 patients found not to have central nervous system, hepatic or myocardial disease. The method used for the determination of GOT in the spinal fluid or serum is a colorimetric one devised by Reitman and Frankel. In our laboratory this method has been proven clinically to be as accurate as the original Karmen method. The Reitman-Frankel procedure is less tedious, expensive and time-consuming than that of Karmen. The normal range of CSF-GOT was found to be 1 to 25 units with a mean of 13.8. The normal range for this enzyme in the serum using the Reitman-Frankel procedure is between 5 and 40 units with a mean of 21.2.

The question arose as to whether increases of GOT enzymatic activity in the cerebral spinal fluid would occur after acute cerebral vascular accident in man as it does in the serum after acute myocardial infarction or hepatic necrosis since all three organs contain large quantities of this enzyme.

Only 8 of 27 determinations (30 per cent) of CSF-GOT on patients with cerebral vascular accidents were above 25 units. There was only a 6-unit increase in the mean of this group as compared to the normal. Considerable overlap existed between both groups so that slight elevations of GOT activity occur after cerebral vascular accidents but not enough to be clinically significant. It appears that the production of experimental cerebral infarcts results in relatively higher values as compared to those seen clinically—a conclusion already established by Fleisher and associates.

In the group consisting of various neurological disorders, wide variations were found within each disease category, most of which were within the normal range. The highest elevations were found in a patient with cryptococcosis and one with toxoplasmosis.

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Mental Health Clinic

"—The First Cooperative Endeavor of the State and Community" of This Type

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"Kansas ranks third from the bottom among states in the amount of professional help available in state institutions."

"Kansas ranks first. APA standards call for one physician for over thirty patients hospitalized. Kansas mental hospitals have one-and-a-half for every thirty."

These comments of the press reflect widely known facts concerning the advancement in the care of the mentally ill in Kansas over the past decade. Since 1948 stories of the changes in the state mental institutions have appeared throughout most of the country. This change may be observed at other levels. A renewed interest in help for emotional ills has shown itself not only in our state hospitals, but also at the community level. Perhaps the community outlook has not yet had the widespread publicity that the other advances have had, but it is not as old. One of the brighter beams of this new light on mental health is the topic I want to discuss here—the Community Health Clinic. To give you a picture of this program and the part played by our state hospitals, I shall describe the first cooperative endeavor of the state and community, the Riley County Mental Health Center in Manhattan, Kansas.

November 19, 1956, was the date of the official opening of the center, but this was also the date of the end of a phase of planning. Six years of work and many ideas had gone into making this "official opening date" possible. These pioneer attempts to do new things were not without hardships and disappointment.

The County Mental Health Association began a long process of community education with films, talks, and various group meetings, helping the community to understand their mental health needs and how such a center would help fill these needs. Community organizations had to be contacted for moral and financial support, committees and boards had to be organized, goals had to be set. Prevention and treatment of mental illness headed the list of these goals. Community education and planning for better mental health, also on this list, were begun six years before November 19, 1956. The community felt, if these goals were met, that the crippling and severe psychiatric disorders could be prevented, that many people could be kept in society and out of mental hospitals, and that the cost of mental illness could thus be reduced. In order to achieve its end, the community program called for a professional psychiatric team—psychiatrist, psychologist, and social worker—to be made available at the local level. The sources of income necessary to embark on such a course were:

A summary of the difficulties of establishing this first cooperative mental health clinic, and the ways in which they were overcome, together with a summary of the numerous services offered, and a look at the value it has for the community.

(1) The County Department of Social Welfare, (2) The State Board of Health, (3) Estimate of Fees, (4) Voluntary Contributions.

With this groundwork laid, a full time psychiatric social worker was employed as administrator and the center was opened in the county hospital. The location was later changed to a centrally located suite of offices in the downtown area. This change of location resulted in a definite change of community attitude toward the center. The center ceased to be a child or arm of the hospital and assumed its own identity. With this change came an increase of referrals, especially from community agencies and individuals themselves.

One of the unique features of the Mental Health Center is the type of cooperation that exists with the state and especially the state hospital system and Topeka State Hospital. The Center was the first such venture in this state and perhaps in the nation. For the first time, a state hospital loaned its staff to a county to act as staff on the local community level. Difficulties arose early because there were no specific laws authorizing such a loan. This cooperation was thus ended and for a time the Center was able to get some consultation on a part time basis from other sources, but this situation proved to be unsatisfactory and again the Center was without psychiatric help.

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Presented at Psychiatric Meeting in Kansas City on May 5, 1957.

Two laws were then passed by the Legislature which, (1) gave permission for the State Department of Institutions to help set up such a center—in other words, to officially authorize the loan of staff of Topeka State Hospital, and (2), authorized the City-County Board of Health to levy a quarter mill tax for the support of such a Center. In July, 1957, the Topeka State Hospital sent a psychologist and two psychiatrists to Manhattan under these new laws.

At present, the Mental Health Center has been in operation for one-and-one-half years, providing a wide variety of professional services to individuals, families, agencies, and the community at large. There are no residency requirements for eligibility for these services and the fees are based on the person's ability to pay.

The services offered by the Center include the following:

A. Screening all types of psychological and emotional, family and individual problems—done by the psychiatric social worker.

B. Evaluation of psychological problems of adults and children—done by the entire professional team.

C. Psychological testing related to problems of evaluation, learning, and job placement.

D. Child guidance to parents having difficulty with children's social adjustment, school development, emotional disturbances, mental retardation, and physical handicaps.

E. Assistance with emotionally disturbed children.

F. Marital counseling.

G. Psychotherapy and case work for emotional disturbances of adults.

H. Counseling services to families of mentally ill persons concerning problems of planning for hospitalization and adjusting themselves to the changes during and following a patient's hospitalization.

I. Follow-up counseling services and treatment for patients returning from psychiatric hospitalization to assist them in a smoother return to family, friends, and community life, when further psychiatric care is recommended.

J. Community educational service—talks and seminars on various phases of mental illness and health to agencies and groups in the community.

K. Consultation with professional persons or agencies, such as ministers, teachers, and employers, concerning the mental health aspects of their work.

L. Community planning—participation with various community groups concerned with efforts to meet better the problems of mental health on a broader scale.

Throughout this paper, I have been referring to a mental health center, instead of a clinic. This name was chosen because of these latter services, to indicate that more than clinical services are available, that this center is indeed for the mental health of the community.

Earlier I mentioned the state and community cooperation in this Center. Today a staff from Topeka State Hospital spends one day a week at the Center. Their time is spent in testing, evaluating, consulting, and treating individual and community mental health problems. There is a close liaison with the community's doctors who refer many cases to the Center. This close working relationship has been expanded to include many community agencies. In addition to physicians, referrals have come from family members and individuals themselves, the clergy, the schools, and health and welfare agencies.

This community cooperation has resulted in the first year in 94 new cases being opened for service at the Center. Seventy of these were closed within the first year. Since mental illness rarely if ever affects only the individual, but also family members and associates, it was estimated that these services to these 94 directly or indirectly affected the lives of over 360 people. An average of twenty hours a month was devoted to community education. As the second year progresses, these figures have continued to increase.

What does this activity in Riley County mean for the mental health of that area, the state hospitals, and Kansas? Has this new approach to an old problem answered any questions? Yes, I think it has. Since professional psychiatric help is now available at the county level, early treatment and prevention of mental illness has become possible.

What about the community? Will the state have to continue to fill staff posts on a part time basis? I think the answer is that it will not be necessary. As the community realizes how such a center is able to fill its mental health needs, the importance of having a full time psychiatrist in the community will become clear. This community has become aware in the past year of the need for such services. Their willingness to meet these needs has increased with their awareness.

With the necessary laws passed and an example set, a stronger light on one of the approaches to mental health has been lit. One more way for communities to deal with their problems in mental illness has become apparent.

The Riley County Mental Health Center in Manhattan has now been in operation for almost two years. It took a number of years to prepare for such a Center and its growth has not been easy. In a unique way, the state and state hospital have had an important role in assisting this center. This method of working together can now, by law, be used elsewhere. Kansas has made headlines in the past decade with the changes in her mental institutions. This activity in Riley County is one of the signs that these changes can continue on other levels.

School Health

The Physician's Role in Educational Activities in Kansas

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Most of the physician's life work is relegated to the diagnosis and treatment of disease. However, in dealing with children, both in the office and in the community, the physician must and does assume responsibility for maintenance and protection of the health of the child. This maintenance and protection of the health of the child is a concern of every practicing physician as well as of educators, public health workers, and dentists. Each profession has its role. The results of the services of each profession become increasingly effective as each person assumes his responsibility along with the parent in protecting the child's health and well being.

We in Kansas, then, turn to a team-work type of activity in the field of school health. We include parents, teachers, physicians, dentists, nurses, and representatives of voluntary health and civic organizations, working together as a big team to foster improved activities in school health.

This team coordinates its activities in the community, develops mutual understanding between the professions, differentiates responsibilities of various individuals on the team, recognizes local needs, and develops procedures to meet them with local resources.

Reflecting casually about this subject, the physician might limit his thoughts to the physical examination or the health appraisal of the child and to the administracion of prophylactic immunizations. Nothing could be farther from reality. These activities are only a minute part of the total field of school health.

What Is a School Health Program?

The school health program is divided, on theoretical grounds, into three general overlapping areas: (1) health instruction, (2) healthful environment, and (3) health services.

A. *Health instruction* is primarily the educator's responsibility. However, the physician's role should become that of the consultant. He should advise the educator on health subjects to be taught, the validity of sources, and the accuracy of subject matter, as well as on the timeliness of health and medical information. Physicians, hospital personnel, and community health workers are used as teaching aids in schools.

B. The second large sub-division of such a program is that of *healthful school environment.* Here the responsibility is primarily that of educators, but it is shared by the Health Department. The latter agency acts under the existing law, local and state. Again, the local practicing physician can serve as a consultant in this area. Certainly he needs to know the scope of health environment in the schools. The more obvious aspects of a physical environment concern adequacy of lighting, cleanliness of rooms and of lavatory facilities, a program for preventing infectious disease, custodial care, physical and mental health of teachers, safety of school children on the playground, safe playground equipment, protection of the child going to and from school, and adjustment of school activities to meet the needs of the child, not only the healthy one but the handicapped one also.

C. When considering *health services* in the school, the physician becomes vitally interested as he is often forced to participate in this activity. He has the major responsibility here especially, and almost totally is the responsibility his in the realm of diagnosis and treatment of illness found in school children. He cannot perform this function alone, without the cooperation of other members of the team. For maximum effectiveness, each profession must recognize the abilities of the others and be willing to allow them to perform their share of the work. There are several important divisions of school health services:

1. The physical educational program and athletics
2. Emergency care of illnesses and injuries on the school premises
3. Control of communicable disease
4. Health appraisal and screening procedures
5. Recognition of health needs of the child and a follow-up program designed to supply these needs.

It is obvious, then, that the physician must be a member of the team in the field of direct health services. It is also obvious that other members of the team must be present and functioning for an adequate program in health services.

Each child in Kansas should have a complete medical appraisal to determine his physical, mental, and emotional status at the onset of his schooling. He should also be given the benefit of repeated and periodic screening procedures such as visual and hearing tests. He should have good, professionally guided and continued appraisal by educators on the adequacy

of his performance. Given this knowledge, the educator can better understand the total health of the child, his behavior in the classroom, and his success or failure in learning. The educator alone is not qualified to complete this appraisal but must act under the guidance of professional personnel. Here, then, comes an important conclusion: that the physician's portion of this responsibility is best assumed by the child's own personal physician in his own office, at periodic intervals, with knowledge of the adequacy of the child's functioning in the classroom before him. For the best service to this child, there must be excellent liaison between the educator and the physician. Here the parent acts as a carrier of information. The teacher's knowledge of the child's performance should be transferred directly to the physician. Results of various screening procedures in the school and information on the performance of the child in athletics and physical education, as well as in the classroom, should be in the hands of the physician at the time of the health appraisal examination.

To allow a child to get the most out of his physical education program, and to prevent injury, the advice of physicians is essential. This advice is best given by the pupil's own physician.

In the handing of emergencies, such as accidents on the schoolgrounds, headaches, sudden elevation of temperature, rashes, incidents, etc., the physician must be placed in the role of advisor in planning standing orders to be followed by educators in each eventuality. He should instruct faculty members as to their role in caring for an acutely ill child until a physician can be summoned. A set of standard orders and procedures for the handling of these emergencies, delineated by the practicing physician, should be in the hands of the school faculty.

In this same vein, in communicable disease control, the physician has a responsibility to inform teachers of infectious diseases that he sees in his practice, to set up procedures for handling these diseases in school, and to advise control measures to be taken by the school.

In the care and education of the physically and mentally handicapped child, the physician assumes a major role. The limitation of this child to learn, whether physical or mental, is not an educational responsibility but must be determined medically.

The reader should be impressed with the broadness in scope of a school health program and with the necessity for having a practicing physician on the team working toward better health for the individual school child.

Present Status of School Health in Kansas

Recent medical activities in the field of school health, at the *state level,* began in early 1956 with the formation of a Committee on School Health by the Kansas Medical Society. This committee has since participated in many activities. It has attempted to work through county medical societies to get the local physician interested in his own school health situation. It has acted as an advisory group to state agencies and educators. Members of the committee have participated in educational activities for teachers and were instrumental in the formation of a Kansas School Health Advisory Council.

The Kansas School Health Advisory Council was formed in the fall of 1958 to promote and advise local communities and state agencies in the field of school health activities. It is composed of some 30-odd organizations, spearheaded by the Kansas Medical Society, the State Department of Education, State Board of Health, Kansas Teachers' Association, Kansas State Dental Association, Kansas State Nurses' Association, and the Parent-Teacher Association. The organization is composed of specialists in this field, qualified to advise educators, as well as physicians working locally. This is one great step forward to coordinate state activities in school health and to stimulate local improved health conditions for the child in school.

For years, the Kansas State Board of Health has been holding workshops in school health in communities throughout the state. These have been community undertakings with outside consultants acting as instructors and guidance personnel.

For 10 years postgraduate courses have been held in the field of school health at the School of Education of the University of Kansas. These postgraduate courses have been attended by physicians as well as by educators and school health nurses. The State Department of Education is now attempting to broaden its work in the field of school health. Many independent civic and service organizations have been working in their own fields in this program. A few of these might be mentioned: The Kansas Tuberculosis and Health Association, the Kansas Heart Association, the National Foundation, mental hygiene organizations, etc.

When one analyzes the number of people working toward a common goal, that of improving the health of the child in school, and the amount of work done by the various agencies, one gathers the feeling that the physician, especially the local physician, could do a little more work in this field.

What is the *local situation* as regards school health programs? Let us consider two general divisions of school health programs at the local level: the larger school systems and the rural school systems. Much work has been done in the larger educational systems. In most instances, recent advances have been spearheaded by interested educators. They

realize the importance of healthful living conditions for the child in school, the importance of adequate education in the field of personal health, hygiene, and physical education, and the importance of knowledge of the pupil's limitations and medical condition.

A few specific school systems might be mentioned here. The Lawrence school system has a well coordinated school health program with a School Health Council functioning. Olathe is making inroads into community organization for school health. Wichita, for some time, has had a good, well organized school health and counseling program. Topeka recently had a school health survey by a physician, a specialist in school health, and is making progress toward an organized school health program. Community organized school health programs are also getting underway in other areas of Kansas.

The problems of a large school system are materially different from those of a small school system. In large schools one has the problem of loss of identity of the individual pupil because of masses of children under one roof. The emotional development of the child in a large school population is entirely different from that of a child in a small school situation. When one considers emotional health, one comes to the conclusion quickly that in smaller schools it is easier to maintain the worth of the individual; the teacher-pupil relationship is closer and there is usually a more healthful emotional environment.

The problem of health education, however, is much greater in smaller school systems.

In large school systems the problem of over-crowding (because of the trend of young families to move to the city or to the more populous areas) has become acute. Building programs in most of the larger school systems of the state are proceeding at a rapid rate. One wonders if adequate consideration is given by local Boards of Education to the health needs of the child in the building of a school. Is adequate consideration given to the playground area? To construction of a health room and health service area? Are lavatory facilities adequate? Are lighting facilities good? Is health counseling requested in the development of plans for building a new school?

Little is known about the total school health programs of *rural school systems*. The majority of children receiving education in Kansas fall into this group. The State Board of Health recently released a preliminary report on school inspections made by the health officer of each county. In all, 3,700 schools were examined. The preliminary report deals with 1,375 of these inspections. Out of a total of 105 counties in Kansas, 54 have reported. A state law obligates the local health officer, or his staff, to make a fall inspection of all schools. Recently unform reporting sheets were provided by the State Board of Health, and a guide delineating standards and recommendations has been developed for use in this survey. The results of this survey are seen in the following chart:

Preliminary Report on School Inspections

Elementary schools	3,000	(approximately)
Over 4 teachers (3 classes or more)	1,100	
Less than 4 teachers (1-3 rooms)	1,900	
High schools	700	

Of total 3,700 schools—1,375 have reported.
Of total 105 counties—54 counties have reported.

Schools more than 4 teachers	1,100	390 reporting
Excellent—29 new	39	
Satisfactory	210	
Substandard	119	
Unacceptable	22	
Schools less than 4 teachers	1,927	768 reporting
Excellent—40 new	44	
Satisfactory	186	
Substandard	323	
Unacceptable	215	
High and junior high schools	700	217 reporting
Excellent—18 new	31	
Satisfactory	120	
Substandard	58	
Unacceptable	8	

Some generalizations can be made from this preliminary study. Generally, the schools classified as unacceptable, or substandard, are rural schools. There are, however, many outstanding exceptions.

Reasons for the lack of acceptance fall into the following categories:

1. Outdoor, poorly maintained, often extremely unsanitary toilets, not connected to any sewage system. Some school sewage systems drained onto playground areas.

2. Water which is unfit for human consumption by bacteriological survey, contaminated wells, lack of proper drinking vessels, etc. Approximately 30 schools showed water which was grossly contaminated by bacteriological survey. From 100 to 150 schools were suspected of false tests (done at improper moments after chlorination, etc.). Some schools have no water. (Children bring water from home or have water hauled in milk cans.)

3. Crowded, poorly maintained buildings, or rooms with minimum light and maximum dirt and dust.

4. Out-dated and sometimes hazardous heating systems. Can one teach health in unsanitary surroundings? Should our children be exposed to unnecessary dangers of unclean water, fire hazards, etc.?

Another problem becoming more common is location of a school near highways and heavily traveled areas. In many instances no precautions have been taken to enclose the grounds or play areas to prevent accidents.

The survey showed some inadequacies in the con-

struction of new schools. Although the majority of new schools are excellent, some are built on inadequate grounds, and many are constructed so that the quality and the distribution of light are extremely poor. New school construction must meet national building code standards and must be approved by an architect. There is no provision for approval by the State Board of Health or the State Board of Public Instruction. Some new schools are built with inadequate square footage per pupil, deficient restroom facilities for the school population, etc. Fire hazards were found in many schools. So far in this survey, 30 schools are seen to have no fire fighting equipment and 40 more schools have outdated and ineffective fire fighting apparatus.

Concerning smaller schools and health instruction, one can say only that the health instruction the childen get depends upon the knowledge and interest of the teacher. There is no health curriculum guide in existence in most of these small school areas.

There are many bright spots in the local school health situation, however. Many communities have had and are continuing to hold school health workshops, as previously mentioned.

Many local physicians are becoming interested in what is being taught and in the health environment of their local schools. They are acting on school boards or as medical advisors to educators. Several new local school health committees are being formed to counsel educators in improving health services, health instruction, and healthful environment. Physicians of the Kansas Medical Society's Committee on School Health have been participants in many teacher district conferences, talking on health subjects. The future is bright for an improved teamwork approach to this problem.

Plans for the Future

The American Medical Association has been interested for years in promoting conferences between school personnel and practicing physicians. Conferences for physicians and schools have been held throughout the country under sponsorship of the A.M.A. The University of Kansas Medical School, for the past four or five years, has held a postgraduate course in school health and is interested, under Chancellor Murphy's direction, in increasing physician participation in local school health matters.

The establishment of a health division in the State Department of Public Instruction seems a likely possibility. The effect of the newly formed State School Health Advisory Council on the local school health situation will undoubtedly be felt. This organization offers an area for resource material, professional guidance, consultative services, and organized coordinated activities for furthering local school health activities.

The continued functioning of the Kansas Medical Society's Committee on School Health will undoubtedly have its effect upon the practicing physician. The interest of educational institutions in the state which train our teachers makes it appear that in the future our educators themselves will be better versed in the field of health and better equipped to teach this subject to our children.

But, most important, is the realization by all professions that to attain maximum efficiency a teamwork approach is paramount. The medical societies, national, state, and local, are beginning to realize that participation is of value to the physician, to the child, and to the community. It is essential for the best coordinated and most adequately organized school health program.

Conclusions

In any school the primary goal is the production of a healthy, educated person. The health of the child is a primary responsibility of his parents. The educator is charged with determining how and when the child will learn and must rely upon the disciplines of medicine, public health, psychology, physiology, dentistry, and many others, for the basic content of what is to be taught on health.

The health problems of children today are not what they once were. Progress has been made in prevention of infectious disease by inoculation and through the use of sanitary principles. Education on the value of vitamins and of good diet has been effective. This means the objectives of health services for our children cannot be the same as they once were.

We have taken pride in lengthening our life span, in reducing our infant mortality rate, in treatment of illness, in advances in diagnosis. However, have we looked at the total health picture? Parents who think they have healthy children should look a second time. These children may appear healthy but may actually be far from optimum health. Is this child functioning at capacity in the school situation?

Attaining the maximum degree of leadership by the medical profession of Kansas will depend upon whether there is active participation by all physicians and whether the county medical societies of Kansas participate by forming local school health committees.

The School Health Committee of the Kansas Medical Society urges the participation of the local physician in the formation of local school health councils. This is the only mechanism by which the teamwork principle is applied.

Medical Arts Building
1001 Horne Street
Topeka, Kansas

Clinicopathological Conference

Headache, Transitory Hemiplegia, Confusion and Coma

Case Presentation

The subject of this conference was a 65-year old white man who was admitted to KUMC for neurosurgical evaluation on August 9, 1957. He died on September 16, 1957.

He had apparently been in good health until about three months before admission when he developed a pain in the right side of his face. This pain lasted for one month, and was relieved by the extraction of two teeth, one of which was reported to be abscessed. Four days after the extraction, while vacationing in Colorado, he complained of fatigue and poor appetite. At that time he was bitten in the right antecubital fossa by a large insect described as a fly.

Shortly after arriving home from vacation he developed a headache, and began to vomit. He was admitted to a local hospital with a fever of 102 degrees. After four days he was transferred to another hospital where he continued to have fever, headache and vomiting, and, in addition, a stiff neck. A cerebrospinal fluid had a cell count of zero, a total protein of 49 mg. per cent, and a positive Friedlander's culture. A repeat spinal tap showed a total protein of 80 mg. per cent with 2 to 3 per cent lymphocytes and a positive Friedlander's culture. A later spinal fluid contained 164 mg. per cent of protein with 9 white cells.

He continued to have a febrile course, and subsequently developed disturbed vision in his right eye. He complained that he was totally blind for several days, but then recovered his sight. On August 4, he was completely comatose, and had left hemiplegia. There was puffiness around his left eye which was turned outward. During the next five days the hemiplegia regressed, but he was confused and incontinent. He continued to have fever, but he had no seizures.

The patient had been an oil well driller. He had a possible past history of syphilis, and for the preceding three years he had had "heart disease" and an irregular pulse. He had received some medication, but the background of this was unknown.

He was a chronically ill man, and was confused, incoherent and unable to respond logically to questions. His face was flushed, and his neck was stiff. His blood pressure was 130/80; the pulse rate was 92 per minute and grossly irregular; and the respiratory rate was 16 per minute. The pupils were round and irregular, the right being larger than the left and sluggish in reaction. The eyes did not move conjugately. There was an apparent bilateral sixth nerve paresis as well as paralysis of the upward gaze with rotary nystagmus. The optic discs did not show papilledema. There was fresh chorioretinitis on the right. There was no other specific cranial nerve paresis with the possible exception of right facial weakness. He could use all of his extremities well, resisting any movements. The deep tendon reflexes were within normal limits bilaterally. There were no Babinski or Hoffman signs. His chest was clear to auscultation and percussion. There was a grossly irregular cardiac rhythm. There were no abdominal masses or tenderness, and the abdominal reflexes were absent. The bladder was distended. He was incontinent of feces. He responded to painful stimuli bilaterally. He had no abnormal skin markings.

The specific gravity of the urine was 1.014 with a heavy trace of albumin, 6 to 8 pus cells per high power field, and the specimen was loaded with amorphous urates. Repeat urinalyses showed specific gravities of 1.011 and 1.016 with traces of albumin. One specimen contained 1.25 mg. per cent of sugar, and was loaded with red cells and occasional white cells and casts. On admission the hematocrit was 52 ml. The hemoglobin was 15.6 gm. and varied to a minimum of 12 gm. The white count was 19,200 with 87 per cent polymorphonuclears (all filamented), 8 per cent lymphocytes, and 5 per cent monocytes. Repeat white cell counts were from 12,350 to 32,000 on the day of death. On September 2, 1957, the hematocrit was 40 ml., and the white count was 12,350 with a differential of 90 per cent polymorphonuclears (all filamented), 7 per cent lymphocytes, 2 per cent eosinophiles, and 1 per cent monocytes. On September 9 there were 77 per cent polymorphonuclears (67 filamented), 19 per cent lymphocytes, 1 per cent eosinophiles, 2 per cent monocytes, and 2 per cent metamyelocytes. The platelet count was 204,000 shortly after admission. The serology was non-reactive.

Edited by Jesse D. Rising, M.D., and Mahlon Delp, M.D., from recordings of the conference participated in by the departments of medicine, pediatrics, surgery, radiology, and pathology of the University of Kansas Medical Center, as well as by the third and fourth year classes of students.

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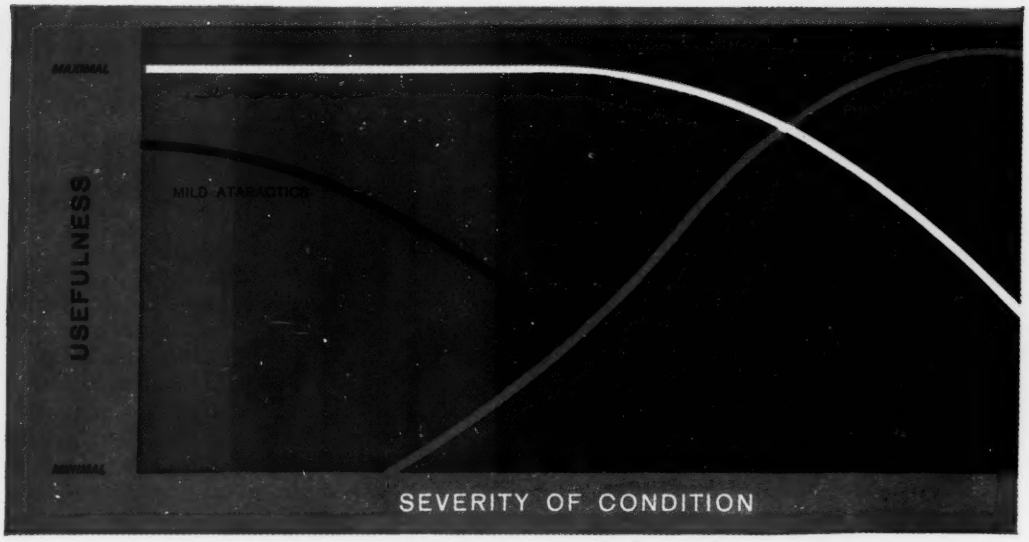

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Guest Instructors:

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DWIGHT E. CLARK, M.D., University of Chicago, Ill.
KYRIL B. CONGER, M.D., Temple University, Philadelphia, Pa.
HENRY DOUBILET, M.D., New York University, New York City.
MERLIN K. DU VAL, JR., M.D., University of Oklahoma, Oklahoma City.
BEN EISEMAN, M.D., V. A. Hospital, Denver, Colo.
KARL E. KARLSON, M.D., State University of New York, Brooklyn.
CARL A. MOYER, M.D., Washington University, St. Louis, Mo.
ALTON OCHSNER, M.D., Tulane University, New Orleans, La.
MARK M. RAVITCH, M.D., Johns Hopkins University, Baltimore, Md.
GRAFTON A. SMITH, M.D., Columbia, Mo.
ROBERT N. WATMAN, M.D., Ohio State University, Columbus.

Subjects to Be Discussed:

Acute Cholecystitis.
The Jaundiced Patient.
Results of Operative Treatment for Carcinoma of the Stomach.
Methods of Intestinal Intubation in Small Bowel Obstruction.
Controversial Issue—Gastric Ulcer.
A Comparison of Medical and Surgical Treatment of Gastroduodenal Hemorrhage.
The Management of Bleeding from Esophagogastric Varices.
The Selection of Treatment in Thyrotoxicosis.
The Undescended Testicle (Cryptorchidism).
Blood Volume Deficit in Acute Pancreatitis.
The Selection of Treatment in Regional Ileitis.
Controversial Issue—The Choice of Operation for Chronic Pancreatitis.
Parenteral Nutritional Support of the Surgical Patient.
Decompressive Measures for the Large Bowel (Trauma).
The Management of Testicular Tumors.
Diagnosis of Pancreatic Lesions.
The Relationship of Ulcerative Colitis to Carcinoma of the Colon.
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The blood urea nitrogen on admission was 6 mg. per cent; glucose, 104 mg. per cent; sodium, 126 mEq/L; potassium, 4.1 mEq; chloride, 82 mEq. On August 21 the carbon dioxide was 35 mEq; sodium, 139 mEq; potassium, 4 mEq; chlorides, 92 mEq; calcium, 4.3 mEq; phosphorous, 1.5 mEq. On August 28 the sodium was 132 mEq; potassium, 4.2 mEq; chloride, 95 mEq; carbon dioxide, 25.2 mEq; calcium, 4.4 mEq; phosphorous, 1.3 mEq; albumin, 2.59 gm. per cent. On September 13 the sodium was 133 mEq; potassium, 3.9 mEq; chloride, 101 mEq; carbon dioxide, 25.2 mEq; albumin, 2.87 gm. per cent; globulin, 2.54 gm. per cent.

The spinal fluid (August 9) was clear with an opening pressure of 190 mm. of water, and a closing pressure of 80 mm. The cell count was 15 red blood cells, 165 white blood cells with 12 per cent polymorphonuclears and 88 per cent lymphocytes. The colloidal gold was 0***43221 (*atypical); sugar, 15 mg. per cent; sodium chloride, 610 mEq; protein, 177 gm. per cent. A Wassermann test was negative. On August 12 the cerebrospinal fluid cell count was 110 white blood cells with 72 per cent lymphocytes; no red cells; sugar, 20 mg. per cent; protein, 210 gm. per cent. On August 21 there were 18 white blood cells and 5 red blood cells; the sugar was 21 mg. per cent; sodium chloride, 640 mEq; protein, 158 gm. per cent. On September 7 there were 110 white blood cells, 46 per cent of which were lymphocytes; sugar, 28 mg. per cent; sodium chloride, 740 mEq; protein, 180 gm. per cent.

The sodium excretion varied from 66 to 207 mEq/L in 24 hours; potassium, 18 to 57 mEq; chloride, 77 to 165 mEq. On August 23 the blood ammonia was 103 mcg. per cent, and the blood pH was 7.57. A spinal fluid culture on admission was negative at 72 hours, and an India ink study was negative. A urine culture on August 15 developed a scant growth of non-hemolytic staphylococcus. Five blood cultures drawn shortly after admission, repeat spinal fluid cultures and repeat India ink studies were all negative. On August 21 a proteus species was isolated from the urine. On August 15 the total serum bilirubin was 0.5 mg. per cent, direct bilirubin, 0.1 mg. per cent; alkaline phosphatase, 1.0 millimol units; bromsulphalein retention, 14 per cent; cephalin cholesterol, negative; thymol turbidity, 1 unit; albumin, 2.76 gm. per cent; globulin, 2.26 gm. per cent; and cholesterol, 107 mg. per cent with 57 per cent esters.

The patient was extremely lethargic and confused. On August 11 he was given intravenous fluids consisting of glucose, saline and supplemental potassium. The stiffness of his neck became more marked. On August 13 he lapsed into a deep coma, his respiration became irregular, and his pulse rate was slow. The rigidity of his neck disappeared. His pupils were pinpoint. There was no papilledema.

On August 14 he was transferred to the neurology service. He was given 1 gm. of chloramphenicol and 0.5 gm. of streptomycin every eight hours. His blood pressure fluctuated, dropping as low as 90/50. On August 15 his blood pressure rose acutely to 140/80, but dropped to 85-95/60-70 the next day. During the first eight hospital days his temperature was between 99.2 and 103.4 degrees. On August 17 it dropped to normal, but rose to 103.2 degrees on August 21. On August 29 his temperature again returned to normal, and there were only slight elevations until September 12 when it rose again to 101 degrees, rectally, where it remained until his death.

He was given intravenous fluids because of his inability to eat and swallow. On August 14 he was started on 100 mg. of isonicotinic hydrazide, three times a day. On August 16, 100 mg. of hydrocortisone was added to the intravenous fluid, and this was done daily until August 23 when the dose was decreased to 50 mg. On August 17 a femoral catheter was placed for continuous intravenous therapy. From August 24 to August 26 he was given 25 mg. of polymyxin B every six hours. On August 26 the hydrocortisone was changed to 25 mg. intramuscularly every twelve hours. Because of prolonged intravenous fluid therapy supplemental magnesium and calcium salts were added to the intravenous fluids. On August 27 the chloramphenicol was discontinued and 500 mg. of tetracycline was given three times in the intravenous solutions. On September 11 the hydrocortisone was stopped, but he continued to receive 1.5 gm. of tetracycline and 1 gm. of streptomycin daily and 200 mg. of INH three times a day. On September 15, 100 mg. of hydrocortisone was added to the I.V., and the intravenous fluids were subsequently discontinued.

During the first few hospital days he responded slightly to commands to move, but afterward he showed no further changes. Spinal fluid specimens on August 21 and 28 were xanthochromic. An intrathecal block could not be demonstrated. On September 15 his blood pressure dropped to 80/60. The pulse rate was 110 per minute, thready and irregular, and there was Cheyne-Stokes respiration. His skin became mottled in appearance. His blood pressure was unobtainable for eight hours before death on September 16, 1957.

Dr. Mahlon Delp (moderator): Are there any questions?

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* Although a student at the time of this conference in February, 1958, he, like the others referred to as students, received the M.D. degree in June, 1958.

Thomas Raymond (fourth year medical student)*: What were the results of the skin tests?

Dr. Robert Manning (resident in medicine): Both the tuberculin and histoplasmin skin tests were positive.

Mr. Raymond: What was the coccidiodin skin test?

Dr. Manning: It was not done.

Harold Ray (student): How many India ink studies were done?

Dr. Manning: Three India ink studies were done, and all were negative.

Robert Shaskey (student): Were any weight changes noted before or after admission?

Dr. Manning: No.

Mr. Ray: Were the sputum or gastric washings cultured?

Dr. Manning: No sputum or gastric washings were done.

Donald Rorabaugh (student): How many spinal fluid cultures were made for tuberculosis?

Dr. Manning: Three cultures were done.

James Rhodes (student): What was the result of the ear, nose and throat examination?

Dr. Manning: It was not remarkable.

Mr. Rhodes: Were lymph nodes found at any time?

Dr. Manning: No unusual lymph nodes were found.

Walter Reazin (student): Had he ever traveled through the San Joaquin Valley?

Dr. Manning: His wife said that he had not.

Mr. Raymond: Had he been given any antibiotics before his admission?

Dr. Robert Weber (internist): I do not believe so.

Mr. Shaskey: What was his oral intake while he was in the hospital?

Dr. Manning: He took a limited amount by mouth during the first two or three days, but none after that.

Mr. Rorabaugh: What was the venous pressure and circulation time?

Dr. Delp: Dr. Hudson remarked that his peripheral circulation time was increased. How did you arrive at that estimation, Dr. Hudson?

Dr. Robert Hudson (internist): His skin color failed to return to normal after pressure.

Dr. Delp: That is a good clinical observation. Now, are there any other questions?

Roger Youmans (student): Is there a correlation between the blood glucose levels and the spinal fluid glucose levels?

Dr. Manning: On August 13 the blood sugar level was 104 mg. per cent.

Dr. Delp: We will now see the electrocardiograms.

Mr. Rhodes: A tracing taken on August 21, 1957, shows a rate of approximately 80, a slightly irregular sinus rhythm, and ventricular premature contractions. The P waves are upright, and there is a slight depression of the S-T segments. The QRS-T vector is between 0 and 10 degrees, and the transition zone is at V_2. I interpret this tracing as showing a slight sinus arrhythmia with premature ventricular contractions and possibly myocardial ischemia.

The next tracing taken on the day before death (Figure 1) shows a rate of 120 and an irregular sinus rhythm. The P waves are peaked in leads II and, again, there is a depression of the S-T segments and probably premature atrial and ventricular contractions. With the exception of the increased rate, I interpret this tracing as being similar to the first tracing.

Dr. Delp: What is your interpretation of the P-R interval?

Mr. Rhodes: I believe it is within normal limits, being between 0.08 and 0.12 seconds.

Dr. Delp: May we have the x-rays now, please?

Mr. Robinson: A lateral skull plate taken on admission shows a normal sella and some prominent vascular markings. The pineal body is calcified and appears to be in a normal anatomical position. No bony erosion is seen. In the frontal projection the calcified pineal appears to be shifted. There is rotation of the skull which makes this difficult to evaluate.

A chest plate taken on admission does not show elevation of the diaphragms. There is no calcification in the hilar areas, and the lung fields are clear. There is apparent widening of the mediastinum, but I believe this is a distortion caused by the supine position of the patient. I interpret this as a normal chest plate.

A KUB film taken on admission is somewhat obscured by overlying gas in the bowel. There are no abnormal soft tissue shadows. There is apparent scoliosis of the lumber spine to the right, but the patient was rotated, and I interpret this as a normal KUB film.

Dr. Delp: Dr. Youngstrom, may we have your comments?

Dr. Karl Youngstrom (radiologist): I agree essentially with that interpretation, and I do not see anything unusual in the skull films.

Dr. Delp: We will now have the discussion, Mr. Rorabaugh.

Differential Diagnosis

Mr. Rorabaugh: A 65-year old man was first admitted to this hospital three months after the onset of his illness which was originally manifested as soreness and pain on the right side of his face. These

symptoms persisted for about a month until relieved by the extraction of two teeth. Four days after the dental work he had an acute onset of meningeal irritative symptoms with fever, and the disease progressed to a chronic stage, terminating in death. Because of this clinical course my differential disgnosis will be the consideration of diseases which cause chronic meningitis with emphasis on cerebrospinal fluid findings and the absence of positive cultures.

Carcinomatosis of the central nervous system gives a similar course and cerebrospinal fluid findings. There is, however, no evidence of a primary elsewhere in our patient, and, discounting the original symptoms of jaw involvement, the onset was too acute.

Sarcoidosis occasionally involves the central nervous system and may produce identical spinal fluid findings, but it runs a benign course, involves other systems, and gives rise to an increased globulin.

Infectious diseases must be considered strongly. Syphilis, especially, may cause a chronic meningitis, but I shall dismiss this disease because of the absence of serologic evidence of syphilis. An encephalitis of obscure origin may be caused by trichinosis, and central nervous system involvement occurs in 10 to 17 per cent of such cases. But without evidence of the involvement of other systems and in the absence of eosinophilia, I shall rule this out.

Toxoplasmosis must be considered. In infants there is the triad of internal hydrocephalus, chorioretinitis and intracranial calcification. This may also occur in adults, but it more commonly involves the skin and lungs. I shall rule out this disease on the basis of the patient's age, the absence of intracranial calcification, and a relatively low cerebrospinal fluid cell count.

Inadequately treated bacterial meningitis must be considered. This disease has a similar course to our patient's, and must also be considered because of the extraction of teeth preceding the onset of his disease. I shall rule out this possibility because of the absence of the typical findings in the spinal fluid and lack of positive cultures in this hospital. Furthermore, the patient failed to respond after adequate antibiotic therapy was given.

Rickettsial diseases can be dismissed because of the absence of any skin eruption, the lowered cerebrospinal fluid sugar, and the extended course. Viral infections, particularly lymphocytic choriomeningitis, must be considered, but these infections have a relatively short, benign course; when fatal, they are usually rapidly so. The sugar is found to be normal in the cerebrospinal fluid in these patients.

Foremost in my consideration are the mycoses and tuberculosis which characteristically present similar findings. They can be proved only by demonstration of the organism in the cerebrospinal fluid when evidence of involvement of other organs is lacking. Wide dissemination may occur with any of the mycotic infections, but, of these, *Cryptococcus neoformans* has a definite predilection for the central nervous system. Actinomyces, blastomyces, coccidioidomyces, nocardia and monilia are all reported to invade the central nervous system, but occur infrequently and usually involve other sites. These diagnoses can also be based upon certain immunological studies, whereas studies for *Cryptococcus* are not yet available. Because our patient presented primarily with central nervous system involvement, my discussion will be concerned with *Cryptococcus* infections. I recognize that meningeal infection caused by these agents cannot be separated clinically, and that demonstration of the organism is necessary for a definitive diagnosis.

Cryptococcosis, sometimes called torulosis, is a relatively rare, subacute or chronic, highly fatal infection which may involve any part of the body, but has a marked predilection for the brain and meninges. The organism is an oval cell surrounded by a large capsule which can be outlined clearly in India ink preparations, and which grows readily on Sabouraud's agar. Our patient's clinical course parallels that occurring in torulosis in which there is an insidious (or occasionally sudden) onset of headache, vomiting and stiff neck accompanied by progressive fever. As the disease progresses there are more severe signs such as ocular palsy, chorioretinitis, increased intracranial pressure, ataxia, or hemiplegia. The patient finally becomes comatose, and there is respiratory failure. It has been reported that 70 per cent of these patients die within the first three months, and 86 per cent die within the first year. The usual cerebrospinal fluid findings are increased pressure, increased mononuclear cells, decreased sugar and chlorides. Diagnosis is dependent on demonstration of the organism.

Tuberculous meningitis is common and secondary in incidence only to the meningococcus as a cause of meningitis. Its onset and course is commonly similar to the description of *Torula*. Cerebrospinal fluid findings do not differentiate these two diseases. Tuberculous meningitis is more common in childhood and early adult life, but it may occur later. It may develop from generalized miliary tuberculosis or pulmonary tuberculosis, and is not infrequently the presenting aspect of this disease. Without medical treatment it is rapidly fatal, but adequate treatment initiated in the early stages may arrest 80 to 90 per cent of these cases. When treatment is begun in the later stages, as in our patient's case, only about 25 per cent recover. Again, a definitive diagnosis can

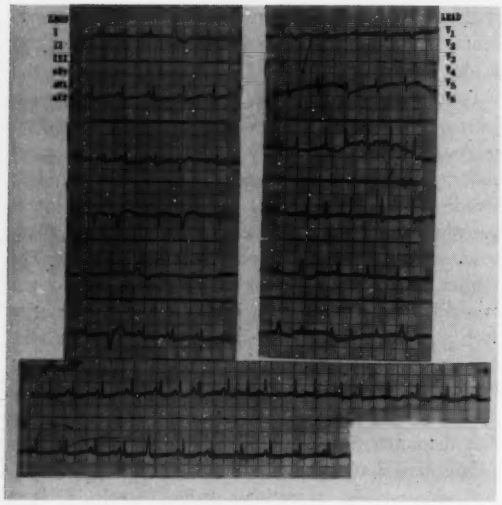


Figure 1. Electrocardiogram taken on August 8, 1957.

be made only by demonstration of the organisms. I believe, however, that our patient had a chronic meningoencephalitis with tuberculosis or *Torula* as the etiological agent.

The neurological symptoms are best explained by diffuse basilar involvement of the meninges. The electrolyte pattern on admission is probably best explained by vomiting, dehydration and fever. I believe that our patient died of diffuse meningoencephalitis with brain stem involvement causing respiratory depression and circulatory collapse.

Clinical Discussion

Dr. Delp: Thank you. Mr. Raymond, may we have your diagnosis?

Mr. Raymond: My diagnosis is torulosis.

Dr. Delp: Mr. Ray?

Mr. Ray: Torulosis.

Dr. Delp: Mr. Reazin?

Mr. Reazin: Cryptococcal meningitis.

Dr. Delp: Mr. Shaskey?

Mr. Shaskey: Torulosis.

Dr. Delp: Mr. Rhodes?

Mr. Rhodes: I believe he had a fungal infection other than *Cryptococcus*.

Dr. Delp: Mr. Robinson?

Mr. Robinson: Cryptococcosis.

Dr. Delp: What is your diagnosis, Mr. Rorabaugh?

Mr. Rorabaugh: I believe he had tuberculosis.

Dr. Delp: Does his response to INH and streptomycin disturb you?

Mr. Rorabaugh: No, the response is poor when treatment is instituted late.

Dr. Delp: What do you believe is the connection between our patient's facial pain and his final illness, Mr. Raymond?

Mr. Raymond: Other fungal infections could localize spots such as this; he could have had a fungal abscess of the tooth, and there could also have been involvement of a cranial nerve with a fungus.

Dr. Delp: Mr. Ray?

Mr. Ray: I believe he had a pyogenic abscess.

Dr. Delp: Do you believe he had a toothache?

Mr. Ray: Yes.

Dr. Delp: Mr. Rhodes, what is your opinion?

Mr. Rhodes: I believe his toothache was unrelated to his illness.

Dr. Delp: Do you believe you would recognize a toothache, or would you believe you had a pain in your face, Mr. Rorabaugh?

Mr. Rorabaugh: I probably would know that I had a toothache.

Dr. Delp: Do you believe that most people would know if they had a toothache?

Mr. Rorabaugh: I believe they would.

Dr. Delp: Mr. Raymond, why do you discard the diagnosis of bacterial meningitis so readily?

Mr. Raymond: There is a higher pleocytosis in bacterial meningitis, and, excluding tuberculosis, the spinal fluid sugar and chloride are normal. Furthermore, he should have responded to the antibiotics.

Dr. Delp: Mr. Rhodes?

Mr. Rhodes: I believe that an abscess would have formed if he had been inadequately treated, and he had no localizing signs.

Dr. Delp: Mr. Raymond, did you discard syphilis because the patient had a negative serology?

Mr. Raymond: The protocol reported a negative Wassermann in the spinal fluid. The meningovascular type of syphilis may cause symptoms similar to his, but this disease is almost always associated with a reactive spinal fluid.

Dr. Delp: Dr. Weber, what was your diagnosis?

Dr. Weber: I saw the patient shortly after his admission. With two reports of Friedlander's bacillus I believed that a diagnosis of bacterial meningitis should be considered first. The organism is not difficult to culture, and, when our laboratory was unable to find it, that diagnosis lost its appeal. I would also have expected the cell count to be much higher if this had been a true bacterial meningitis. The low sugar, the chronicity, and the other reports all suggested tuberculosis which is a bacterial meningitis.

Dr. Delp: You recommended INH and streptomycin, didn't you?

Dr. Weber: Yes, I did.

Dr. Delp: What was your diagnosis, Dr. Steegmann?

Dr. Theodore Steegmann (neurologist): The patient had meningitis and focal lesions referrable to the superior brain stem level. Because of the spinal fluid changes it seemed necessary to rule out the more chronic types of meningitis. The cultures for *Cryptococcus hominus* and for tuberculosis were negative, but he was given therapy for possible tuberculous meningitis because the spinal fluid changes seemed to point most strongly in that direction. It is relatively easy to identify ordinary *Torula* infection with an India ink preparation and culture, but these were reported negative on two occasions. Treatment, therefore, was started on the assumption that this was possibly tuberculosis.

Dr. Delp: Do you believe our patient could have tolerated amphotericin B, Dr. Weber?

Dr. Weber: I believe he could have tolerated it, and he possibly should have received it. In my opinion, the combined use of INH, streptomycin and amphotericin B until there is an etiologic diagnosis is quite legitimate.

Dr. Delp: I believe the students all believed he should have had amphotericin B. Is that right, Mr. Rorabaugh?

Mr. Rorabaugh: We strongly considered it.

Mr. Raymond: A bacteriologist reported that the *Klebsiella* organism, when isolated, will appear to be similar to the *Torula* organism, and this may have first suggested a diagnosis of torulosis, in which case amphotericin B should have been used.

Dr. Delp: May we have the pathologist's report, please?

Pathological Report

Dr. Leroy R. Hieger (pathologist): As was expected, the significant lesions were related to the brain. It weighed 1545 grams. Increased intracranial pressure was evidenced by slight flattening of the gyri and narrowing of the sulci. There was a small cerebellar pressure cone and some evidence of uncal herniation.

The meninges were of prime interest because they contained, in close association with the vascular network, numerous yellowish-white, moderately firm nodules, usually discrete but occasionally confluent. These were more prominent over the frontal poles and over the superior surface of the cerebellum than over the other lobes. In addition, the choroid plexus was greyish-white, firm and nodular.

Figure 2. Cryptococci in India ink preparation showing encapsulated yeast.

Figure 3. Meningitis with necrosis of exudate (left), vasculitis (center) with brain (right) unaffected. Clear areas in necrotic exudate are occupied by fungi. Giant cells are present in a vertical line in the right center. PASH X 44.

Consecutive coronal sections of the brain indicated that an area of softening, noted externally, involved mainly the cortex on the right side. Other areas of softening were noted throughout the basal ganglia, the thalamus, around the third ventricle, and, in fact, throughout the brain stem and the cerebellum. These were presumably the cause of death.

In an attempt to identify an organism we made touch preparations of the frontal cortex in particular, and these were stained for bacteria and fungi. From the PAS stains it was readily apparent that we were dealing with an encapsulated yeast. Since there is only one such yeast that invades the nervous system of man, it was obviously *Cryptococcus neoformans,* sometimes called *Torula histolytica.* Cultures yielded a yeast-like growth. An India ink preparation demon-

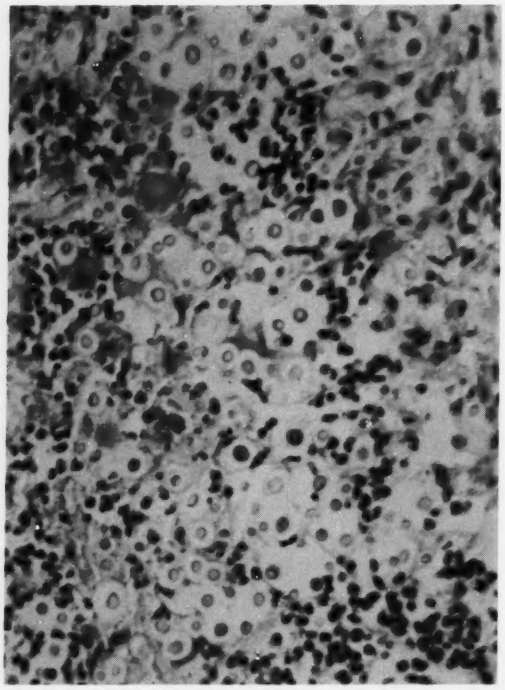


Figure 4. Crypotococcis in choroid plexus accompanied by granulocytes. Clear spaces due to capsule which has shrunken and dehydrated specimen. PASH X 250.

strated the organism with its nucleus and its large capsular halo (Figure 2).

Dr. Thorkil Jensen (department of microbiology) injected eight mice with yeasts from the culture, four intracranially and four intraperitoneally. The first four were all dead within one week. Of the other four, three were dead within four weeks, and one was sacrificed. Organisms and the typical lesions were noted, thus fulfilling Koch's postulates.

Sections through one of the meningeal nodules from the frontal cortex showed yeasts, granulomatous inflammation with giant cells and a rather large amount of necrosis (Figure 3). In addition there was vasculitis with intimal proliferation and narrowing sometimes leading to occulsion.

The choroid plexus was also involved by granulomatous inflammation accompanying yeast forms (Figure 4).

The fungal capsule was demonstrated with mucicarmin, and histochemically with reactions for acid mucopolysaccharides (Figure 5).

The right adrenal contained a granulomatous nodule. Microscopically there were fungi with necrosis, some palisading of epithelioid cells about some of the periphery, chronic inflammatory infitrate, and giant cells (Figure 6). The left adrenal, although not involved with granulomatous inflammation, showed occlusion of the central vein by thrombus, resulting in extensive infarction of approximately three-fourths of the gland.

We thought that the gross specimen demonstrated some atrophy of the right adrenal cortex, and this was confirmed by thinning of the zona fasciculata and reticularis in the microscopic sections. This correlated well with the history of corticoid administration lasting 26 days and discontinued five days before death. The terminal recurrence of fever and of hypotension was probably secondary to adrenal hypofunction, both corticoid-induced and secondary to infarction on the left. An oil red O stain showed good preservation of adrenal lipids on the right.

We sectioned the lungs serially, at about 3 millimeters, but were not able to demonstrate the usual solitary primary cryptococcal lesion. However, we did find, especially in the lower lobes, focal fibrosis, diffuse vesicular emphysema and acute bronchitis. It is tempting to speculate that these might represent the residua of pneumonic infiltration with cryptococci.

An incidental finding, probably related to the periodic bouts of hypotension which this man ex-

Figure 5. Cryptococci showing capsule. PASH X 250 mounted in glycerol-jelly to prevent shrinkage.

perienced before his death, was the acute tubular necrosis, manifested by swelling of the renal tubular epithelium with vacuolation, focal loss of cells, casts, and a chronic inflammatory infiltrate probably due to rupture of cast-filled tubules. That this was not all pre-terminal is suggested by the regeneration of tubular epithelium.

This case did not show the typical lesions of cryptococcal meningitis with the soapsuds appearance of the cortex produced by the extension of the meningeal inflammation along the perivascular spaces of Virchow-Robin (Figure 7). The organisms multiply in these spaces, and, because of the large amount of mucinous capsular material, give rise to space-consuming cystic lesions. Most of the organisms are within macrophages, which are frequently fewer in number than the yeast.

The easiest way to identify cryptococci found in tissues is to demonstrate their capsules. If thin, they are not conspicuous, and there may be difficulty in differentiating *Cryptococcus* and *Histoplasma.* If, instead of dehydrating the slides prior to mounting, one uses aqueous glycerin jelly, the capsule does not shrink, and even thin capsules are readily apparent (Figure 5).[2] There are about seven species of cryptococci of which *neoformans* is the only virulent one. The easiest way to eliminate saprophytic species is to incubate cultures at 37 degrees C. *Neoformans* will grow, and the others will not. Demonstration of virulence for mice is confirmatory.

Torulosis has been reported from Europe, the United States and Australia. Many instances of subclinical infection probably occur, and cutaneous cryptococcosis may regress. Clinical disease more frequently occurs in males between the ages of 30 and 60 years, and seemingly more commonly in the white race. According to the records of the Armed Forces Institute of Pathology, at least 30 per cent of these cases of cryptococcosis are associated with a lymphoma or leukemia. Dissemination is found, as in this case, in about 50 per cent of the clinical cases and in almost all of the cases associated with lymphomas. Prior to the advent of specific chemotherapy, the usual course was about six months, on the average. The patient usually dies of meningoencephalitis, frequently associated with adrenal necrosis.

Dr. Jacob K. Frenkel (pathologist): I admire Mr. Rorabaugh's tenacity of sticking to a reasonable diagnosis in view of so many negative laboratory findings because the purpose of the CPC is to be reasonable rather than right. Tuberculosis is certainly a reasonable diagnosis. I saw this patient three days after entry for what we believed to be a fresh chorioretinitis. On re-examination this was noted to be healed.

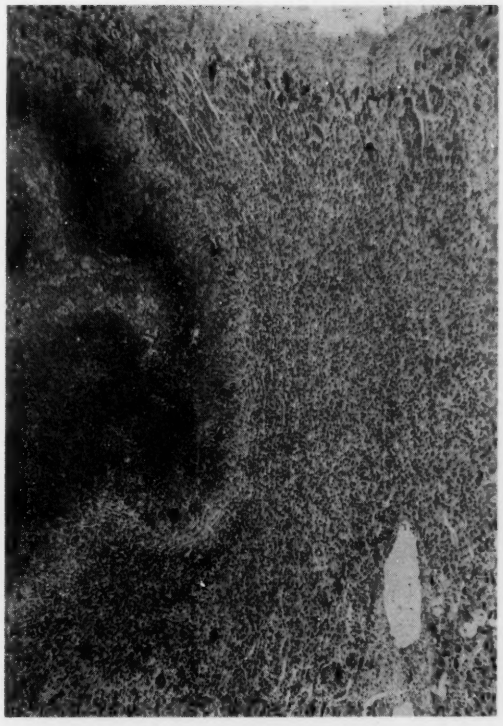


Figure 6. Focal necrosis with surrounding granulomatous reaction in right adrenal. Adjacent to the intact cortical cells is a zone of proliferating fibroblasts followed by epithelioid and giant cells then necrosis. The clear areas contain groups of cryptococci. PASH X 44.

In the presence of fresh chorioretinitis, toxoplasmosis or cryptococcosis needed to be considered. They could not have been diagnosed or ruled out, however, by the data Mr. Rorabaugh had available. The statement previously made that *Klebsiella pneumoniae* (Friedlander's bacillus) looks much like *Cryptococcus* on solid-medium cultures is important, and it may explain the erroneous interpretation of the spinal fluid cultures at the previous hospital. Both organisms form so much mucoid material that they can be confused. They can, however, be differentiated by Gram staining, because *Klebsiella* is a short rod whereas *Cryptococcus* is a spherical organism. The so-called "histolytic" and "neoformans" attributes of *Torula* have been explained by Dr. Hieger. I believe that we need to be more concerned with the cryptic nature of *Cryptococcus,* the fact that it is hidden and usually difficult to find. I made a survey of laboratory technicians to determine whether they knew what *Cryptococcus* or *Torula* was, and in most instances got a negative answer. All medical students have studied this fungus in their pathology and microbiology

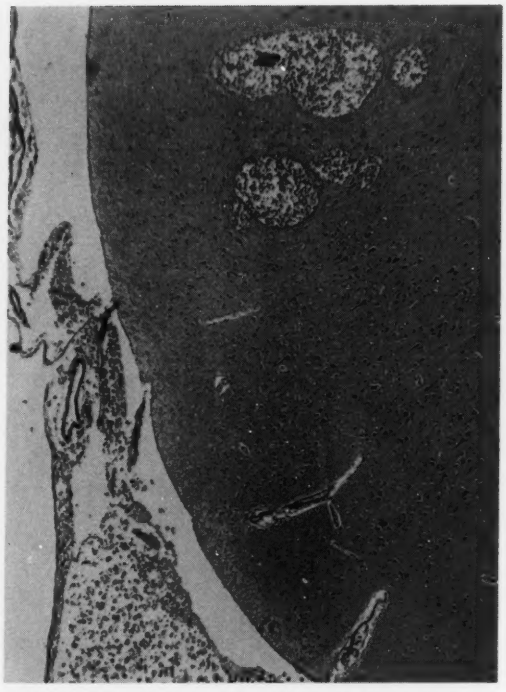


Figure 7. Typical cryptococcic meningitis with mononuclear exudate (below and left) which extends along perivascular spaces into cortex, forming cyst-like dilatation (above). From a different case. PASH X 44.

courses, and it is basically the physician's and the medical student's responsibility either to look at the specimen himself or to take it to the laboratory and verify that the technician knows exactly what examination is requested. Dr. Hieger made smears himself and identified the organisms, and that is the way it should be done.

We see here a rather typical case of cryptococcosis involving two sites where there is least resistance. The meninges are involved owing to the limited phagocytic and digestive ability of the mononuclear cells in the central nervous system. The adrenal infection was aided by the endogenous production of corticoids, locally depressing immunity. The histologic reaction and the necrosis were rather suggestive of tuberculosis (Figure 3). Ordinarily there is little or no necrosis in cryptococcosis (Figure 7). I have recently seen a similar reaction, and both patients had been treated with corticoids. Probably the tendency to necrosis in the meninges was augmented by corticoid therapy. Also the corticoid-induced adrenal hypofunction permitted fibroblastic proliferation around the focus of necrosis in the adrenal (Figure 6). Ordinarily, the high corticoid levels in the adrenals prevent fibroblastic proliferation, and necrosis is progressive, leading to Addison's disease.

Summary

Dr. Delp: The physical diagnostic evidence to be found in the history and examination suggested a form of chronic meningitis. At this point the diagnostic routine broke down with failure to demonstrate the *Cryptococcus* in the spinal fluid. It seems unlikely that the outcome could have been changed, but the fact that laboratory evidence with its vagaries was accepted all too implicitly seems clear.

Pathological Anatomical Diagnosis

Necrotizing cryptococcal meningitis and ependymitis with multiple recent infarcts involving the cerebral cortex, basal ganglia, brain stem, and cerebellum.

Hyperemia and edema of the brain, 1545 grams.

Adrenal vein thrombosis with subtotal infarction, left.

Acute bronchitis and bronchiolitis.

References

1. Littman, A. L., and Zimmerman, L. E.: 1956. Cryptoccocosis. Grune and Stratton, New York. 203p.

2. Mowry, R. W.: The value of mucopolysaccharide hydration in the demonstration of microbial capsules in paraffin sections: with special reference to *Cryptococcus neoformans* and pneumococci. Am. J. Path. 34 (3):595-596, 1958.

Study of Amines and Enzymes

Basic research at the National Heart Institute on the functions of amines as brain hormones and on the enzymes that make and destroy those chemicals in the human body is leading to the development of drugs which may be useful against hypertension, epilepsy, and mental illness.

The amines of greatest current interest are serotonin and norepinephrine. These are found in the brain and other body tissues, where they may influence blood pressure, and other functions that are beyond conscious control.

The drugs under study are compounds which counteract monoamine oxidase (MAO), an enzyme which normally destroys these amines in the body. Many of the effects of these MAO-inhibiting drugs are thought to be due to the accumulation of serotonin and norepinephrine in tissues. Other amines still undiscovered may also be involved.

Because the amines destroyed by MAO have a role in controlling blood pressure, scientists have been exploring the blood pressure effects of the MAO inhibitors. One unusually powerful inhibitor, 1-phenyl-2-hydrazinopropane, or JB 516, has been found by Dr. Louis Gillespie, Dr. Luther Terry, and Dr. Albert

Sjoerdsma, to lower blood pressure in hypertensive patients. The antihypertensive effects of JB 516 appear from these clinical studies to resemble those of certain drugs in wide use against hypertension but to lack their undesirable side effects of blurred vision, constipation, dry mouth, and sexual impotence.

It is too early to determine whether JB 516 itself will be of value against hypertension. Only long usage will show whether it may have its own side effects. But the findings indicate that MAO inhibition may represent a promising new approach to the treatment of hypertension.

MAO inhibitors have also been found by Drs. Darwin Prockop and Parkhurst Shore, working under the direction of Dr. Bernard Brodie, to block the convulsions that result from electric shock and the stimulant drug Metrazol in animals. Because the convulsive response to these agents has been a reliable test for screening anti-epileptic drugs in the past, these findings give hope that MAO inhibitors may be useful against the convulsions of epilepsy. All of three MAO inhibitors studied blocked the electroshock and Metrazol seizures in animals, but JB 516 was again the most effective. With all three, the anticonvulsant effect was shown to be mediated by a rise in the brain amines.

Diagnosis of Virus Diseases

The development of a new method which enables medical authorities to diagnose more quickly such infectious virus diseases as influenza, measles, mumps and chickenpox has won for its originator one of the nation's top honors in the field of public health.

Dr. Albert H. Coons, visiting professor of bacteriology and immunology at the Harvard Medical School and Career Investigator of the American Heart Association, received the eighth annual Kimble Methodology Research Award at the Conference of State and Provincial Public Health Laboratory Directors in St. Louis.

Dr. Coons' method uses a fluorescent dye and ultra-violet light to search out infectious disease viruses.

The key to the work which Dr. Coons and his associates began in 1941 is the fact that antibodies formed in the body to combat disease are specific—for example, an antibody against influenza will react only with an influenza virus. Such antibodies may be tagged with a fluorescent dye so that they will glow under ultra-violet light.

To find a cell infected with a virus such as influenza, serum containing tagged influenza antibodies is put on a slice of tissue. The antibodies will adhere only to the influenza virus. When made to glow under a microscope, the presence of the specific virus is not only detected but accurately located within the cell.

The importance of Dr. Coons' method is the fact that the building blocks of all living things, and the chemical processes they are able to carry out, depend on complex chemical substances which often can only be sorted out by the specificity of antibodies. A labelled antibody, therefore, can search them out and place them in the spotlight of the scientific eye.

Home and Industrial Accidents

In home accidents, which is the most dangerous room in the house? Over 50 per cent of fatal home accidents occur in the bedroom, according to Parke, Davis and Company in its publication for physicians. This figure is more than three times higher than the accident rate in the next most dangerous areas, the living and dining rooms.

In industry, coal-mining remains the most dangerous occupation, although coal-mining injuries have decreased 64 per cent in the past eight years. Injuries incurred in the manufacture of railroad equipment carry the greatest danger of permanent disability, followed by injuries to employees in automobile manufacture. Most industrial injuries, however, involve only temporary disability.

In both industrial and nonindustrial accidents, there seems to be a diurnal cycle.

The publication reports on a study showing that the industrial accident rate was highest at 10 a.m. and again at 3 p.m. during the day shift, and in the first few hours of work during the night shift. Another study of nonindustrial accidents showed that late afternoon, from 3 to 5 p.m., and late evening, from 8 to 11 p.m., were the times when nonindustrial accidents reached peaks.

Who takes care of the accident patient? The general practitioner sees more than 60 per cent of all accident patients, although they account for only about 10 per cent of his time as compared to more than 40 per cent of the orthopedist's time.

Financially, accidents impose a tremendous burden, costing the nation $11.2 billion annually. Accidental deaths have been responsible for 8 to 9 per cent of life insurance death claims each year since 1950, being exceeded only by claims resulting from death due to diseases of the heart and cardiovascular-renal system, and to malignant neoplasms.

During 1957, there were 1,300 fewer highway traffic fatalities than in the previous year.

PRESIDENT'S PAGE

DEAR DOCTOR:

This year begins the second century of existence of the Kansas Medical Society. What better time, then, to glance back into the past and look into the future?

Our society's history is glorious. Many Kansas doctors have made their mark on the national and world medical scene. Our leaders have been wise and have charted the organization safely over many troubled waters. We have a proud heritage.

Kansas and American medicine face an uncertain future. Social and economic changes have occurred which are not to our liking. Legislation is pending which will further alter the "free enterprise" system of medicine we cherish. Only by concerted effort may these changes be averted.

One of the difficult matters confronting your leaders is to know the wishes and desires of its members. Many of you will serve on committees and know intimately this phase of the Society's work. An expression from you requesting a committee appointment is earnestly solicited.

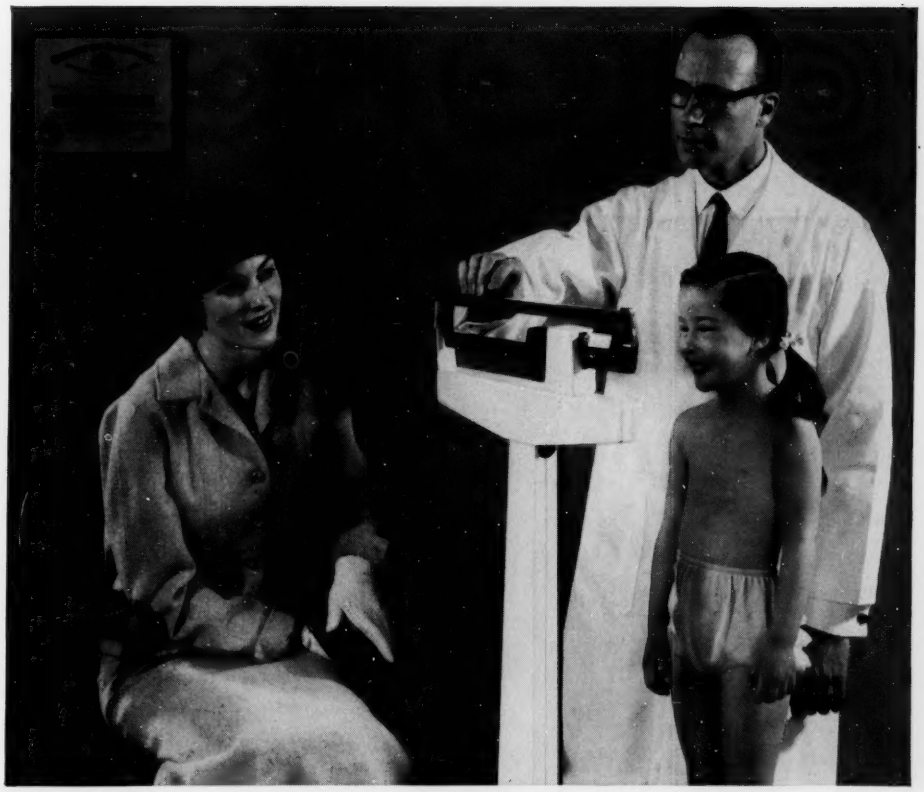
A prime objective of this year will be to acquaint our members with your officers' problems. In turn, we wish to be informed of any constructive plan you have to suggest for society action.

An attempt will be made to indoctrinate and welcome new members. Your help in this matter is requested. Encourage your young colleagues to take part in medical society functions. Acquaint them with the functions and ideals of the Kansas Medical Society. They are the leaders of the future.

Your acceptance of committee chairmanships and appointments has been most heartening. Your ideas and help, to make this 101st year a constructive one, will be most appreciated.

Fraternally,

Glenn R Peters M.D



Underweight Children Gain and Retain Weight with Nilevar®

One of the most convincing evidences of the anabolic activity of Nilevar, brand of norethandrolone, has been its ability to improve appetite and increase weight in poorly nourished, underweight children.

A highly important feature of the weight gain thus produced is that it is not ordinarily manifested by deposition of fat but as muscle tissue resulting from the protein anabolism induced by Nilevar.

Anorexia and "Weight Lag" Study—Brown, Libo and Nussbaum have reported* consistent and definite increases in rate of weight gain in eighty-six patients, ranging in age from 7 weeks to 15½ years. This beneficial action of Nilevar was observed in the patients with organic and traumatic disorders as well as those whose only complaints were poor appetite and/or persistent failure to gain weight.

In this study, the weight gained was not lost after discontinuance of Nilevar therapy although many patients did not continue the sharp gains effected by the drug.

The authors are of the opinion that Nilevar is a highly useful anabolic agent for influencing weight gain in underweight children.

When Nilevar is administered to children a dose of 0.25 mg. per pound of body weight is recommended and continuous dosage for more than three months is not recommended.

Nilevar is supplied as tablets of 10 mg., drops of 0.25 mg. per drop and ampuls of 25 mg. in 1 cc. of sesame oil. Further dosage information in Searle Reference Manual No. 4.

G. D. Searle & Co., Chicago 80, Illinois.
Research in the Service of Medicine.

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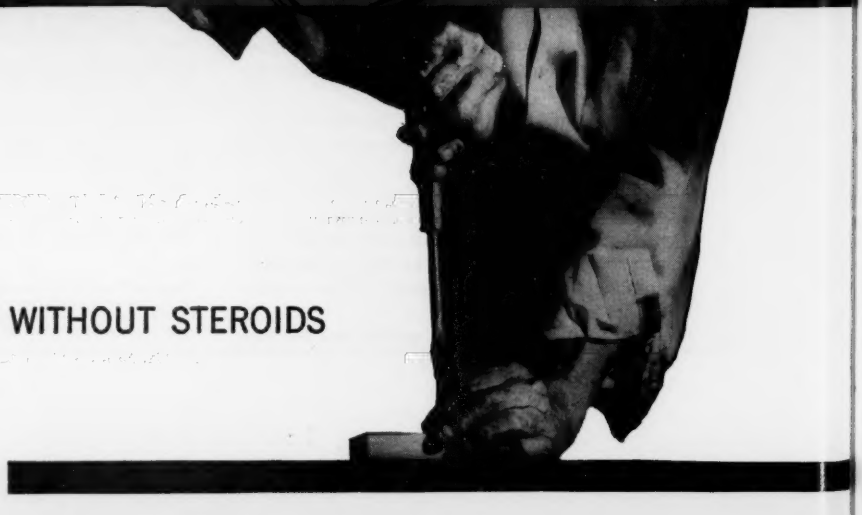
*Brown, S. S.; Libo, H. W., and Nussbaum, A. H.: Norethandrolone in the Successful Management of Anorexia and "Weight Lag" in Children, Scientific Exhibit presented at the Annual Meeting of the American Academy of Pediatrics, Chicago, Oct. 20-23, 1958.

WITHOUT STEROIDS

In every arthritic state...

WITHOUT STEROIDS



WITHOUT STEROIDS

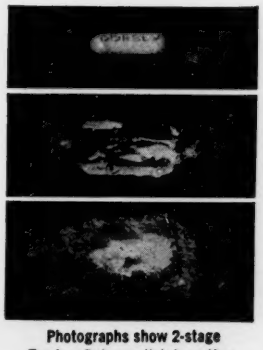
MAINTENANCE THERAPY WITHOUT STEROIDS IS FUNDAMENTAL

Sound, conservative therapy with salicylates has been consistently reaffirmed as basic, long-term maintenance therapy in the arthritides.

Buffered Pabirin provides superior maintenance therapy. It epitomizes fundamental long-term basic therapy since it can be given month after month without serious complications and with minimal problems to patient and doctor alike.

Buffered Pabirin is formulated to provide high and sustained salicylate blood levels. Each tablet consists of an outer layer containing a buffer (aluminum hydroxide), para-aminobenzoic acid, and ascorbic acid; a core of acetylsalicylic acid.

In the stomach, the outer layer quickly releases the buffer, which protects against nausea, dyspepsia and other gastrointestinal symptoms so frequently encountered with salicylates alone. The core of Buffered Pabirin then disintegrates rapidly, permitting rapid absorption of the acetylsalicylic acid for faster pain relief.



Photographs show 2-stage Tandem Release disintegration.

Each tablet contains:
Acetylsalicylic acid (5 gr.).....300 mg.
Para-aminobenzoic acid (5 gr.)....300 mg.
Ascorbic acid ..... 50 mg.
Dried aluminum hydroxide gel....100 mg.

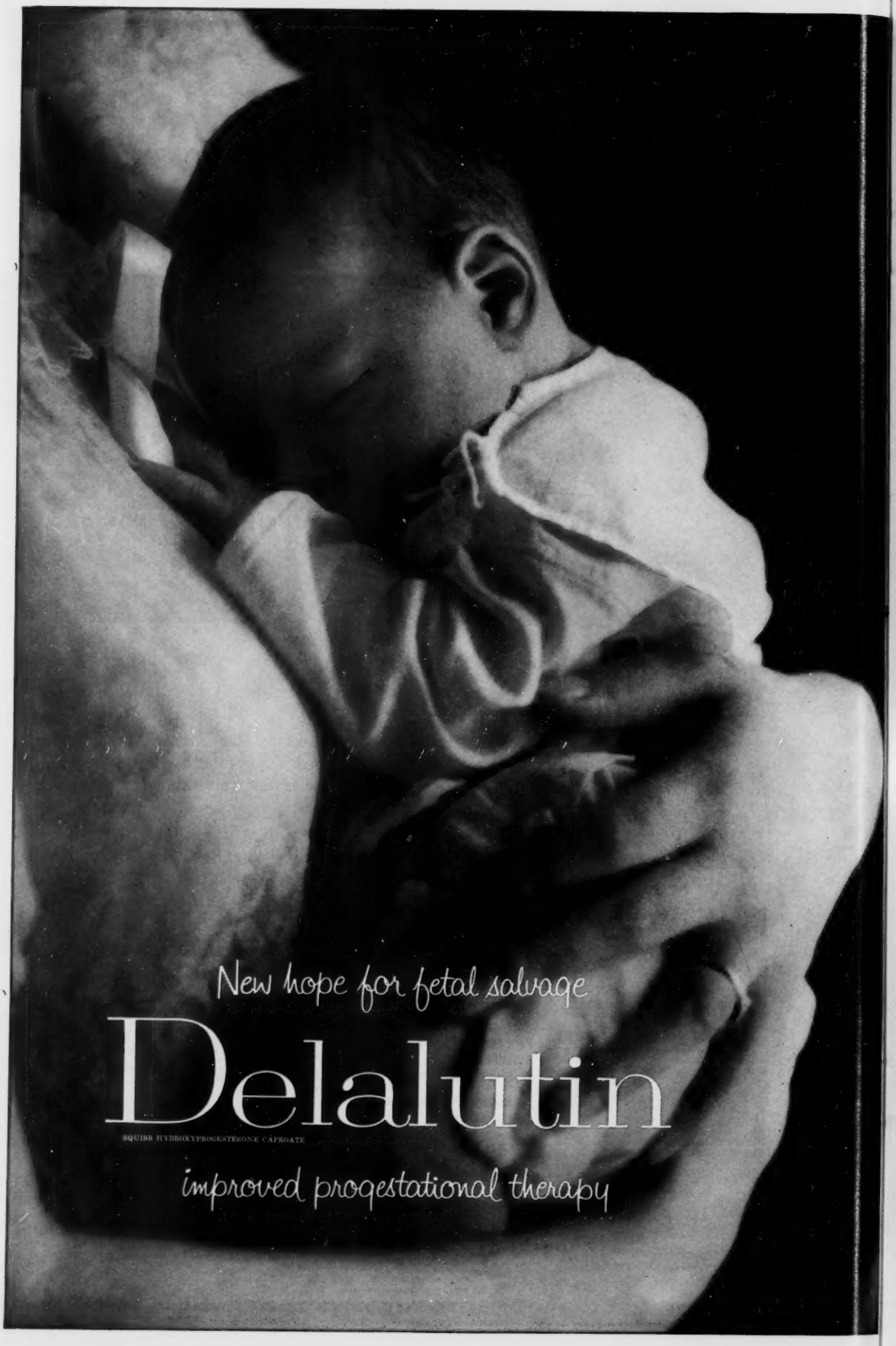
All Buffered Pabirin is sodium- and potassium-free.

Dosage: Two or three tablets 3 or 4 times daily.

References: 1. Hart, D.; Bagnall, A. W.; Bunim, J. J., and Polley, F. H.: Ninth International Congress on Rheumatic Diseases, Toronto, Ont. (June 25) 1957. 2. Report of Joint Committee, Medical Research Council & Nuffield Foundation, Treatment of Rheumatoid Arthritis, British Medical Journal (April 13) 1957. 3. Friend, D. G.: New England J. Med. 257:278 (Aug.) 1957.

Buffered **Pabirin®** *Tablets*

SMITH-DORSEY · a division of The Wander Company · Lincoln, Nebraska · Peterborough, Canada


New hope for fetal salvage
Delalutin
SQUIBB HYDROXYPROGESTERONE CAPROATE
improved progestational therapy

The results of administering Delalutin before the 12th week of gestation to 82 women with habitual abortion were reported recently by Reifenstein.[1] Every patient had experienced at least three consecutive abortions immediately preceding the treated pregnancy. More than 68% of these women were delivered successfully and uneventfully following Delalutin therapy.

Boschann,[2] in a study of pregnancies with threatened abortion, found that:

37% of 73 pregnancies were carried to term without progestational therapy
64% of 42 pregnancies were salvaged by progesterone
83% of 73 pregnancies were salvaged by Delalutin

Eichner,[3] found that with Delalutin fetal salvage of infants below term weight (1000 to 2000 gm.) was significantly improved.
108 (76%) of 142 babies of this birth weight survived without progestational therapy.
16 (100%) of 16 babies of this birth weight survived with Delalutin therapy.
A comparison study was made of a group of repeated aborters treated with Delalutin, and a group with a similar history treated with bed rest and sedation.[4] Pregnancy salvage with Delalutin was twice that of the control group. Delalutin was found to be "highly active," well-tolerated and long-acting.

Delalutin offers these advantages over other progestational agents:

- longer-acting and more sustained therapy
- more effective in producing and maintaining a completely matured secretory endometrium
- no androgenic effect
- more concentrated solution requires injection of less vehicle
- unusually well-tolerated, even in large doses
- requires fewer injections
- low viscosity makes administration easier

DELALUTIN is also potent and safe therapy for: threatened abortion; postpartum after-pains; amenorrhea, primary and secondary; dysfunctional uterine bleeding not associated with genital malignancy; infertility with inadequate corpus luteum function; production of secretory endometrium and desquamation during estrogen therapy; premenstrual tension; dysmenorrhea; cyclomastopathy, mastodynia, adenosis and chronic cystic mastitis.

Administration and Dosage: Because of its low viscosity, Delalutin may be administered with a small gauge needle (deep intragluteal injection). Complete information on administration and dosage is supplied in the package insert.

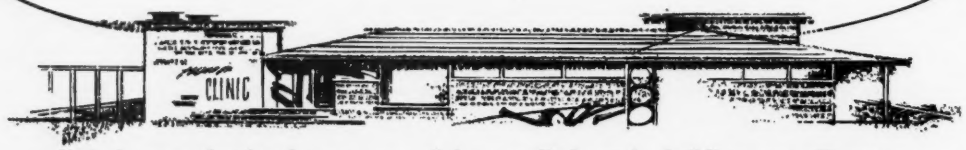
Supply: Delalutin is available in vials of 2 and 10 cc., each cc. containing 125 mg. of hydroxyprogesterone caproate in sesame oil, and benzyl benzoate.

References: 1. Reifenstein, E. C., Jr.: *Annals N. Y. Acad. Sci.* 71:762 (July 30) 1958. 2. Boschann, H-W.: *ibid.*, p. 727. 3. Eichner, E.: *ibid.*, p. 787. 4. Hodgkinson, C. P.; Igna, E. J., and Bukeavich, A. P.: *Am. J. Obst. and Gyn.* 76:279, 1958.

SQUIBB *Squibb Quality—the Priceless Ingredient*

'Delalutin'® is a Squibb trademark

Financing Your New Clinic Building



Early in your planning for your new clinic or medical practice building, you will meet the question of financing its construction.

We would like to suggest a consultation with the Mortgage Loan Department of Farmers & Bankers Life. Over the past twenty years we have made a number of first mortgage loans to doctors throughout the state, for the construction of their own clinic or office buildings.

Ours is a Kansas-incorporated company which has been in business for 47 years, with home offices in Wichita and assets currently exceeding $44 millions. We shall welcome an opportunity to take part in your planning — in strictest confidence and without obligation to you.

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Farmers & Bankers Life
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OXYGEN THERAPY EQUIPMENT

FOR THE OUT PATIENT

2

ALL THE NECESSARY EQUIPMENT — REGULATORS, HUMIDIFIERS, FLOWMETERS, CATHETERS, MASKS, CANNULAS — INCLUDING HIGH PURITY OXYGEN FOR THE TREATMENT OF THE OUT PATIENT.

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B. I. D.

ULCER CONTROL

all day

NEW

DARICON*

oxyphencyclimine hydrochloride

TABLETS

all night

patient comfort

Natural Prolonged Action–The action of DARICON, a more potent and better tolerated anticholinergic, is consistently prolonged because it has a unique chemical structure and is not dependent on "mechanical" means (e.g., special coating, adsorption on ion-exchange resin).

In addition to peptic ulcer, DARICON is also indicated for other gastrointestinal disorders characterized by hypersecretion, hypermotility and spasm (e.g., functional bowel syndrome, chronic nonspecific ulcerative colitis and biliary tract disease).

Dosage: 10 mg. b.i.d. (morning and evening). **Supply:** Tablets, 10 mg., white, scored. Bottles of 60 and 500.

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EVEN REFRACTORY CASES RESPOND

Pfizer *Science for the world's well-being*

PFIZER LABORATORIES
Division, Chas. Pfizer & Co., Inc.
Brooklyn 6, N. Y.

NOW

. . . a new way to relieve pain and stiffness in muscles and joints

INDICATED IN:

MUSCLE STIFFNESS

LUMBOSACRAL STRAIN

SACROILIAC STRAIN

WHIPLASH INJURY

BURSITIS

SPRAINS

TENOSYNOVITIS

FIBROSITIS

FIBROMYOSITIS

LOW BACK PAIN

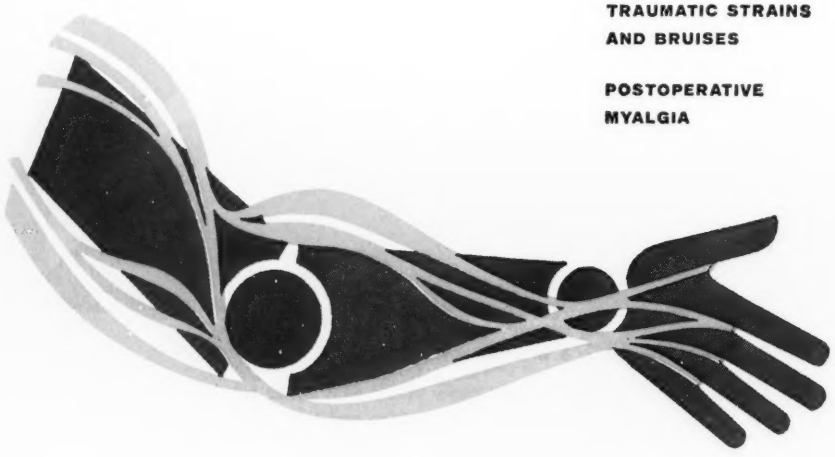
DISC SYNDROME

SPRAINED BACK

"TIGHT NECK"

TRAUMATIC STRAINS AND BRUISES

POSTOPERATIVE MYALGIA



Exhibits unusual analgesic properties, different from those of any other drug Specific and superior in relief of SOMAtic pain Modifies central perception of pain without abolishing natural defense reflexes Relaxes abnormal tension of skeletal muscle

SOMA™

N-Isopropyl-2-methyl-2-propyl-1, 3-propanediol dicarbamate

More specific than salicylates Less drastic than steroids

More effective than muscle relaxants

SOMA has an unique analgesic action. It apparently modifies central pain perception without abolishing peripheral pain reflexes. SOMA is particularly effective in relieving joint pain. Patients say that they feel better and sleep better with SOMA than with any previously used analgesic, sedative or relaxant drug.
SOMA also relaxes muscle hypertonia, with its stresses on related joints, ligaments and skeletal structures.

ACTS FAST. Pain-relieving and relaxant effects start in 30 minutes and last 6 hours.

NOTABLY SAFE. Toxicity of SOMA is extremely low. No effects on liver, endocrine system, blood pressure, blood picture or urine have been reported. Some patients may become sleepy on high dosage.

EASY TO USE. Usual adult dose is one 350 mg. tablet 3 times daily and at bedtime.

SUPPLIED: Bottles of 50 white sugar-coated 350 mg. tablets.

Literature and samples on request.

WALLACE LABORATORIES, NEW BRUNSWICK, N. J.

New

Neocurtasal

TASTES LIKE SALT

New Neocurtasal embodies the characteristic tang, grain and texture of regular table salt. Now whether food is seasoned by New Neocurtasal or salt — few patients detect the difference. Insipid dishes are rendered more palatable, tiresome diets less exacting.

When you must say "no salt," New Neocurtasal effectively cushions the blow. In selecting a most suitable replacement for salt, more and more physicians observe that New Neocurtasal assures close adherence to diet and the utmost in patient cooperation.

NEW **Neocurtasal**®

—available in convenient 2 oz. shakers and 8 oz. bottles.

"An Excellent Salt Replacement"

Contains potassium chloride, potassium glutamate, glutamic acid, calcium silicate, potassium iodide (0.01%).

When Diuresis Is a "Must"—

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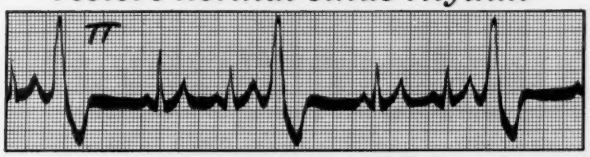
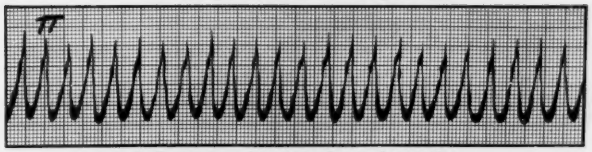
restore normal sinus rhythm



1. Premature ventricular contractions

2. Paroxysmal auricular tachycardia



3. Paroxysmal ventricular tachycardia

in arrhythmias

VISTARIL* hydroxyzine pamoate

More than a tranquilizer

SPECIFIC ANTIARRHYTHMIC EFFECT

Vistaril is effective in ventricular extrasystoles and paroxysmal tachycardias (both auricular and ventricular).

plus

PSYCHOTHERAPEUTIC POTENCY

proven calming action indicated for arrhythmia patients.

and

THE OUTSTANDING SAFETY

of Vistaril as compared to other antiarrhythmic drugs in general use has been noted by investigators.

THE FOLLOWING DOSAGE REGIMEN IS RECOMMENDED (individualized by the physician for maximum effectiveness):

PARENTERAL DOSAGE: 50-100 mg. (2-4 cc.) I.M. stat., and q. 4-6 h., p.r.n.; maintain with 25 mg. b.i.d. or t.i.d. In acute emergency, 50-75 mg. (2-3 cc.) I.V. stat.; maintain with 25-50 mg. (1-2 cc.) I.V. q. 4-6 h., p.r.n.

ORAL DOSAGE: Initially, 100 mg. daily in divided doses until arrhythmia disappears. For maintenance or prophylaxis, 50-75 mg. daily in divided doses.

SUPPLY: Vistaril Capsules, 25 mg., 50 mg. and 100 mg. Vistaril Parenteral Solution, 10 cc. vials and 2 cc. Steraject® Cartridges. Each cc. contains 25 mg. (as the hydrochloride).

Pfizer *Science for the world's well-being*

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Division, Chas. Pfizer & Co., Inc.
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References: 1. Burrell, Z. I., et al.: Am. J. Cardiol., 1:624 (May) 1958. 2. Hutcheon, D. E., et al.: J. Pharmacol. & Exper. Therap., 118:451 (Dec.) 1956.

AN AMES CLINIQUICK™

CLINICAL BRIEFS FROM MODERN PRACTICE

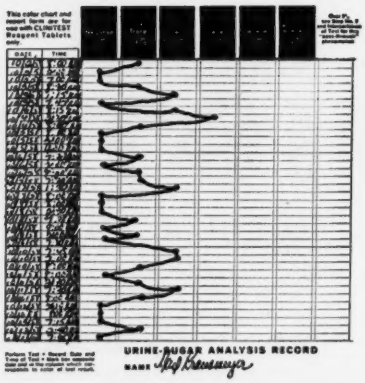
What differentiates "renal diabetes" (renal glycosuria) from diabetes mellitus?

Blood sugar levels. In renal glycosuria they are normal; in untreated diabetes, fasting blood sugars are usually 130 mg.% or over and postprandial levels 170 mg.%, or more.

Source: Joslin, E. P.; Root, H. F.; White, P., and Marble, A.: The Treatment of Diabetes Mellitus, ed. 9, Philadelphia, Lea & Febiger, 1952, pp. 701-702.

A "URINE-SUGAR PROFILE" FOR CLOSER CONTROL

The new CLINITEST Urine-Sugar Analysis Set contains an improved Analysis Record form that enables even closer control of the *moderate* and the *severe* diabetic. Daily urine-sugar readings may be connected to produce a graph—a day-to-day "profile" that reveals at a glance individual trends and degree of control.



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FOR EVEN BETTER CONTROL OF THE MODERATE AND THE SEVERE DIABETIC

the STANDARDIZED urine-sugar test for reliable quantitative estimations "...the most satisfactory method for home and office routine testing."*

*GP *16*:121 (August) 1957.

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when pollen allergens attack the nose...

Triaminic provides more effective therapy in respiratory allergies because it combines two antihistamines[1,2] with a decongestant.

These antihistamines block the effect of histamine on the nasal and paranasal capillaries, preventing dilation and exudation.[3] *This is not enough;* by the time the physician is called on to provide relief, histamine damage is usually present and should be counteracted.

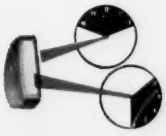
The decongestive action of orally active phenylpropanolamine helps contract the engorged capillaries, reducing congestion and bringing prompt relief from nasal stuffiness, rhinorrhea, sneezing and sinusitis.[4,5]

TRIAMINIC is orally administered, systemically distributed and reaches *all* respiratory membranes, avoiding nose drop addiction and rebound congestion.[6,7] TRIAMINIC can be prescribed for prompt relief in summer allergies, including hay fever.

References: 1. Sheldon, J. M.: Postgrad. Med. **14**:465 (Dec.) 1953. 2. Hubbard, T. F. and Berger, A. J.: Annals Allergy p. 350 (May-June) 1950. 3. Kline, B. S.: J. Allergy **19**:19 (Jan.) 1948. 4. Goodman, L. S. and Gilman, A.: Pharmacol. Basis Ther., Macmillan, New York, 1956, p. 532. 5. Fabricant, N. D.: E.E.N.T. Monthly **37**:460 (July) 1958. 6. Lhotka, F. M.: Illinois M.J. **112**:259 (Dec.) 1957. 7. Farmer, D. F.: Clin. Med. **5**:1183 (Sept.) 1958.

Triaminic®

TRIAMINIC provides around-the-clock freedom from hay fever and other allergic respiratory symptoms with just one tablet q. 6-8 h. because of the special timed-release design.



Each TRIAMINIC timed-release tablet provides:

Phenylpropanolamine HCl	50 mg.
Pheniramine maleate	25 mg.
Pyrilamine maleate	25 mg.

Also available: TRIAMINIC SYRUP for those patients of all ages who prefer a liquid medication. Each 5 ml. teaspoonful is equivalent to ¼ Triaminic Tablet or ½ Triaminic Juvelet. TRIAMINIC JUVELETS provide half the dosage of the Triaminic Tablet with the same timed-release action for prompt and prolonged relief.

STOP *running noses* *and open stuffed noses orally*

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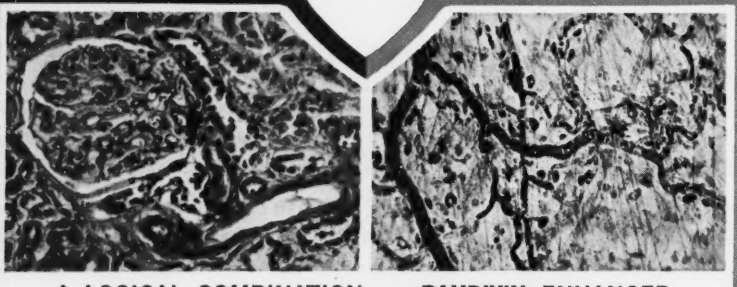
RAUTRAX

RAUDIXIN
Squibb Standardized
Whole Root Rauwolfia Serpentina
FLUMETHIAZIDE
POTASSIUM CHLORIDE



A LOGICAL COMBINATION **RAUDIXIN** ENHANCED
BY AN ENTIRELY NEW DIURETIC — **FLUMETHIAZIDE**

THUS SQUIBB OFFERS YOU GREATER LATITUDE IN SOLVING THE PROBLEM OF

HYPERTENSION

WITHOUT FEAR OF SIGNIFICANT POTASSIUM DEPLETION[1-3]

Rautrax combines Raudixin with flumethiazide — *the new, safe nonmercurial diuretic* — for control of all degrees of hypertension. Clinicians report it safely and rapidly eliminates excess extracellular sodium and water without potassium depletion.[1-3] Potassium loss is less than with any other nonmercurial diuretic.[1] Moreover, the inclusion of supplemental potassium chloride in Rautrax provides added protection against potassium and chloride depletion in the long-term management of hypertension.

Through this dependable diuretic action of flumethiazide, the clinical and subclinical edema — so often associated with cardiovascular disease — is rapidly brought under control.[2-5] And once Rautrax has brought the fluid balance within normal limits, continued administration does not appreciably alter the normal serum electrolyte pattern. Flumethiazide also potentiates the antihypertensive action of Raudixin. By this unique dual action, a lower dosage of each ingredient effectively maintains safe antihypertensive therapy.

Dosage: 2 to 6 tablets daily in divided doses initially; may be adjusted within range of 1 to 6 tablets daily in divided doses. **Note:** In hypertensive patients already on ganglionic blocking agents, veratrum and/or hydralazine, the addition of Rautrax necessitates an immediate dosage reduction of these agents by at least 50%. A similar reduction is necessary when these agents are added to the Rautrax regimen.

Supply: Capsule-shaped tablets supplying 50 mg. of Raudixin, 400 mg. of flumethiazide, and 400 mg. of potassium chloride, bottles of 100.

References: 1. Moyer, J. H., and others: Am. J. Cardiol., 3:113 (Jan.) 1959. • 2. Bodi, T., and others: To be published, Am. J. Cardiol., (April) 1959. • 3. Fuchs, M., and others: Monographs on Therapy, 4:43 (April) 1959. • 4. Montero, A. C.; Rochelle, J. B., III, and Ford, R. V.: To be published. • 5. Rochelle, J. B., III; Montero, A. C., and Ford, R. V.: To be published.

LITERATURE AVAILABLE ON REQUEST.

'RAUDIXIN®' AND 'RAUTRAX' ARE SQUIBB TRADEMARKS

SQUIBB — Squibb Quality — the Priceless Ingredient

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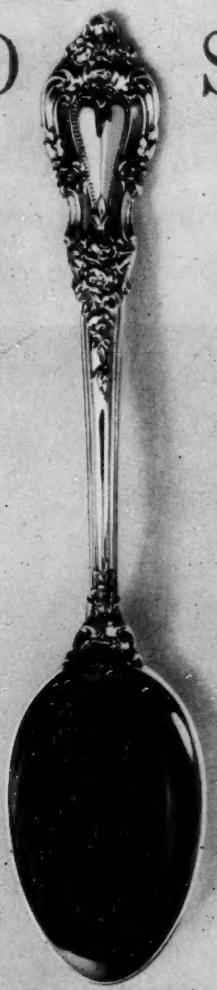

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ACETYL PEDIATRIC SUSPENSION

N[1] Acetyl Sulfamethoxypyridazine Lederle

just 1 dose a day . . . achieves rapid therapeutic levels . . . sustained for 24 hours . . . extremely low incidence of sensitivity reactions and renal complications . . . convenient, highly economical . . .

ALWAYS ACCEPTABLE . . . WHENEVER SULFAS ARE INDICATED

Recommended dosage: first-day dose is 1 teaspoonful (250 mg.) for each 20 lbs. body weight up to 80 lbs. For each day thereafter, ½ teaspoonful for each 20 lbs. For 80 lbs. and over, use adult dosage of 4 teaspoonfuls (1.0 Gm.) initially, and 2 teaspoonfuls (0.5 Gm.) daily thereafter. Administer immediately after a meal.

Supplied: Each teaspoonful (5 cc.) contains 250 mg. of sulfamethoxypyridazine activity. Bottles of 4 and 16 fl. oz.

Lederle LEDERLE LABORATORIES, a Division of AMERICAN CYANAMID COMPANY, Pearl River, New York

Against the "Vaginitis Spectrum"

TRICHOMONAS
MONILIA
BACTERIA

A welcome clinical advance...
effective medication
in an appealing form

Soft and pliant as a tampon, the Milibis vaginal suppository offers proved therapeutic action* in a vehicle giving unusual clinical advantages to both patients and physician.

COVERS CERVIX AND VAGINAL WALL—The pliant Milibis suppository disintegrates readily and molds itself to the cervix as well as the columns and rugae of the vaginal vault.

SHORT DOSAGE SCHEDULE—The short course of treatment with Milibis—only 10 suppositories in most cases—together with the clean, odorless, non-staining qualities eliminates psychic barriers which often interrupt longer treatments before complete cure.

SUPPLIED: BOXES OF 10 with applicator.

Now supplied with plastic applicator

- SANITARY
- INSURES CORRECT SUPPOSITORY PLACEMENT

MILIBIS® Vaginal Suppositories

Winthrop LABORATORIES
New York 18, N. Y.

*97 per cent effective in a study of 564 cases; 94 per cent effective in a series of 510 cases.

Milibis (brand of glycobiarsol), trademark reg. U. S. Pat. Off.

only one Schering Repetab will give your patient

NONSTOP RELIEF FROM NEW YORK ISTANBUL

When you prescribe medication in convenient REPETAB form, your patient taken just before his jet flight leaves Idlewild Airport will give your patient benefits of the first full dose almost as swiftly as his plane soars up and out over the Atlantic. He'll enjoy a single, sustained high therapeutic level for up to 12 hours as his modern plane carries him smoothly over the 5,009 miles. And he can relax until he settles down to shish kebab at Pandeli's 12 hours later... Then his hour flight to Istanbul is just over the horizon. Modern, dependable REPETABS are here now!

You can prescribe these Schering products in REPETAB *form*

CHLOR-TRIMETON® REPETABS, 8 and 12 mg.
Chlorprophenpyridamine Maleate

TRILAFON® REPETABS, 8 mg.
perphenazine

POLARAMINE® REPETABS, 6 mg.
dextro-chlorpheniramine maleate

PRANTAL® REPETABS, 100 mg.
diphemanil methylsulfate

GYNETONE® REPETABS, .02 and .04 mg.
combined estrogen-androgen

DEMAZIN® REPETABS, 4 mg.
Chlor-Trimeton plus phenylephrine

symbol of the one-dose convenience you want for your patient

REPETABS,® Repeat Action Tablets.

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June 8-12, 1959, Atlantic City, New Jersey

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Childbirth featured in largest combined session ever offered by A.M.A. Seven sections—Obstetrics and Gynecology; Anesthesiology; Pediatrics; Preventive Medicine; General Practice; Diseases of the Chest and Nervous and Mental Diseases present a morning long symposium.

Liver diseases presented in a combined symposium and panel session with six sections participating: Internal Medicine, General Practice, Experimental Medicine and Therapeutics, Pathology, Radiology and Gastroenterology.

Typical of the hundreds of speakers and topics scheduled for presentation:

SYMPOSIUM ON HEPATIC DISEASES

"Newer Concepts of Bilirubin Metabolism"
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S. P. Bessman, Baltimore, Maryland

"Current Problems in Hepatic Pathology"
I. N. Dubin, Philadelphia, Pennsylvania

"Current Knowledge of Viral Hepatitis"
Joseph Stokes, Jr., Philadelphia, Pennsylvania

"Radiography in the Diagnosis of Hepatic Disease"
John R. Hodgson, Rochester, Minnesota

"Newer Concepts of Cirrhosis"
Gerald Klatskin, New Haven, Connecticut

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Moderator—Cecil Watson, Minneapolis, Minnesota

Atlantic City is an ideal family playground. The fabulous Boardwalk and world renowned Steel Pier are focal points of interest at this famous ocean side resort.

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Clinical findings in 900 patients show the selective antihypertensive action of Singoserp

IN 735 PATIENTS, BLOOD PRESSURE FELL AN AVERAGE OF 30.7 mm. Hg:

- more than half of these patients suffered from **moderate to severe hypertension**
- more than half of the cases involved hypertension of at least 6 years' standing, with **many histories of up to 20 years' duration**

THE SIDE-EFFECTS PROBLEM WAS MINIMIZED IN MOST PATIENTS:

Chart shows gratifyingly low incidence of side effects in 233 patients given Singoserp with no other antihypertensive medication

Side Effect	Number	Per Cent
Lethargy	7	2.9
Headache	6	2.5
Gastrointestinal upset	3	1.2
Vertigo	2	0.8
Nasal congestion	1	0.4

DOSAGE: Initially, 1 to 2 tablets (1 to 2 mg.) daily.
SUPPLIED: Singoserp *Tablets*, 1 mg. (white, scored); bottles of 100.
Samples available on request. Write to CIBA, Box 277, Summit, N.J.

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a major advance in antihypertensive therapy

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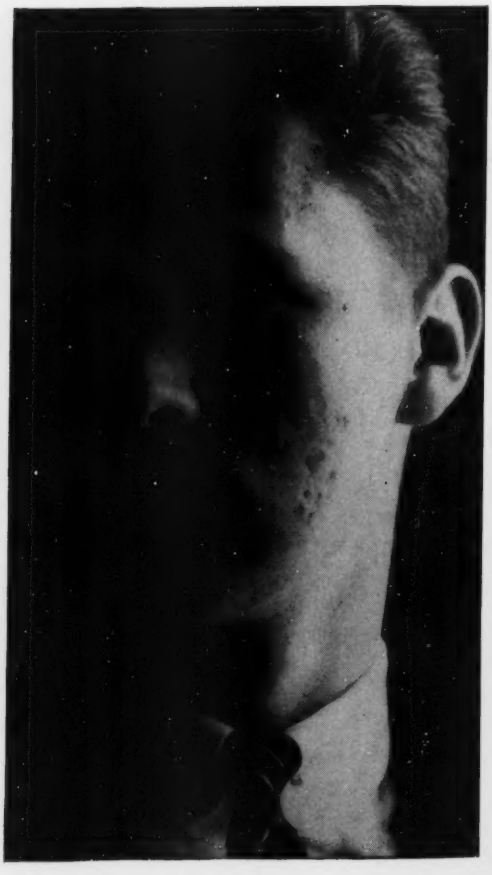
SUMMIT, N.J.

9/2057MK



in Acne

Routine cleansing with pHisoHex augments standard acne therapy. "No patient failed to improve."[1] pHisoHex helps check the infection factor in acne. Used exclusively and frequently, it will keep the skin surface virtually sterile. Contains 3 per cent hexachlorophene.

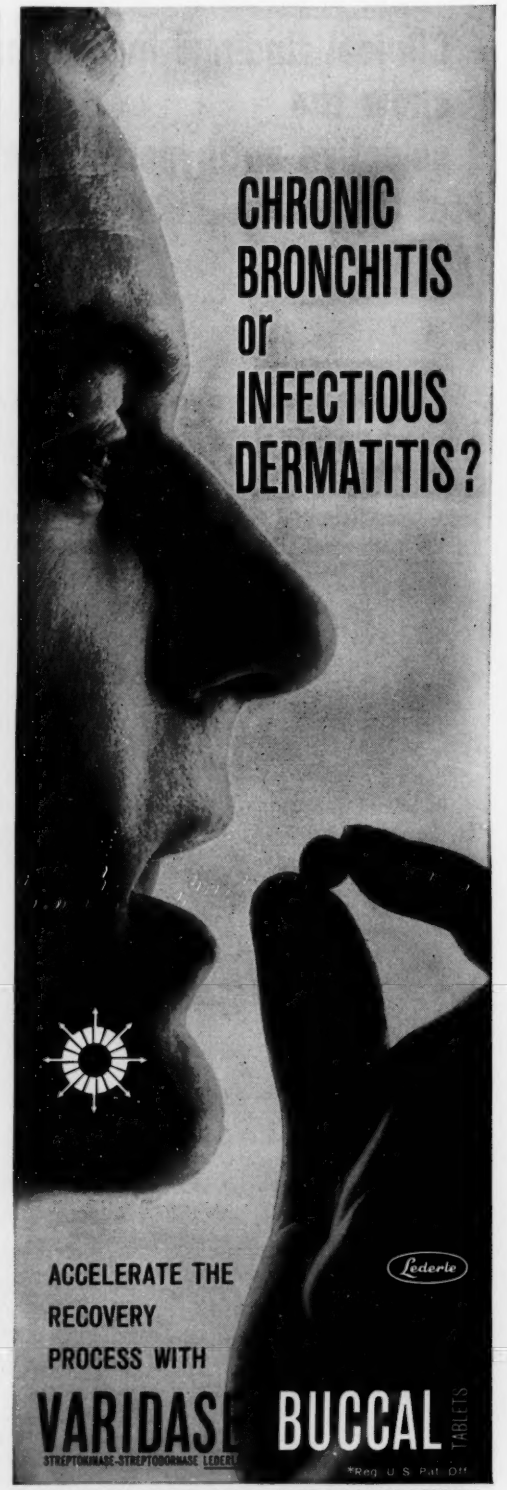
pHisoHex®

(antibacterial detergent, nonalkaline, nonirritating, hypoallergenic)

tips the balance for superior results

Winthrop LABORATORIES
New York 18, N. Y.

1. Hodges, F.T.: GP 14:86, Nov., 1956.



LEDERLE LABORATORIES, a Division of AMERICAN CYANAMID COMPANY, Pearl River, New York

To the relief of musculoskeletal pain, new MEDAPRIN* adds restoration of function

Analgesics offer temporary relief of musculoskeletal pain, but they merely *mask* pain rather than getting at its *cause.* New Medaprin, in addition to bringing about prompt subjective improvement, promotes the *restoration of normal function* by suppressing the inflammation that *causes* the pain.

Medaprin, Upjohn's new analgesic-steroid combination, contains aspirin plus Medrol,** the corticosteroid with *the best therapeutic ratio in the steroid field.*† Instead of suffering recurrent discomfort because of the "wearing off" of analgesics, the patient on Medaprin experiences a smooth, *extended* relief and more normal mobility.

Indications: Medaprin is indicated in mild-to-moderate rheumatic and musculoskeletal conditions, including rheumatoid arthritis, deltoid bursitis, low back pain, neuralgia, synovitis, fibromyositis, osteoarthritis, low back sprain, traumatic wrist, sciatica, and "tennis elbow."

Dosage: The recommended dosage is 1 tablet q.i.d. The usual cautions and contraindications of corticotherapy should be observed.

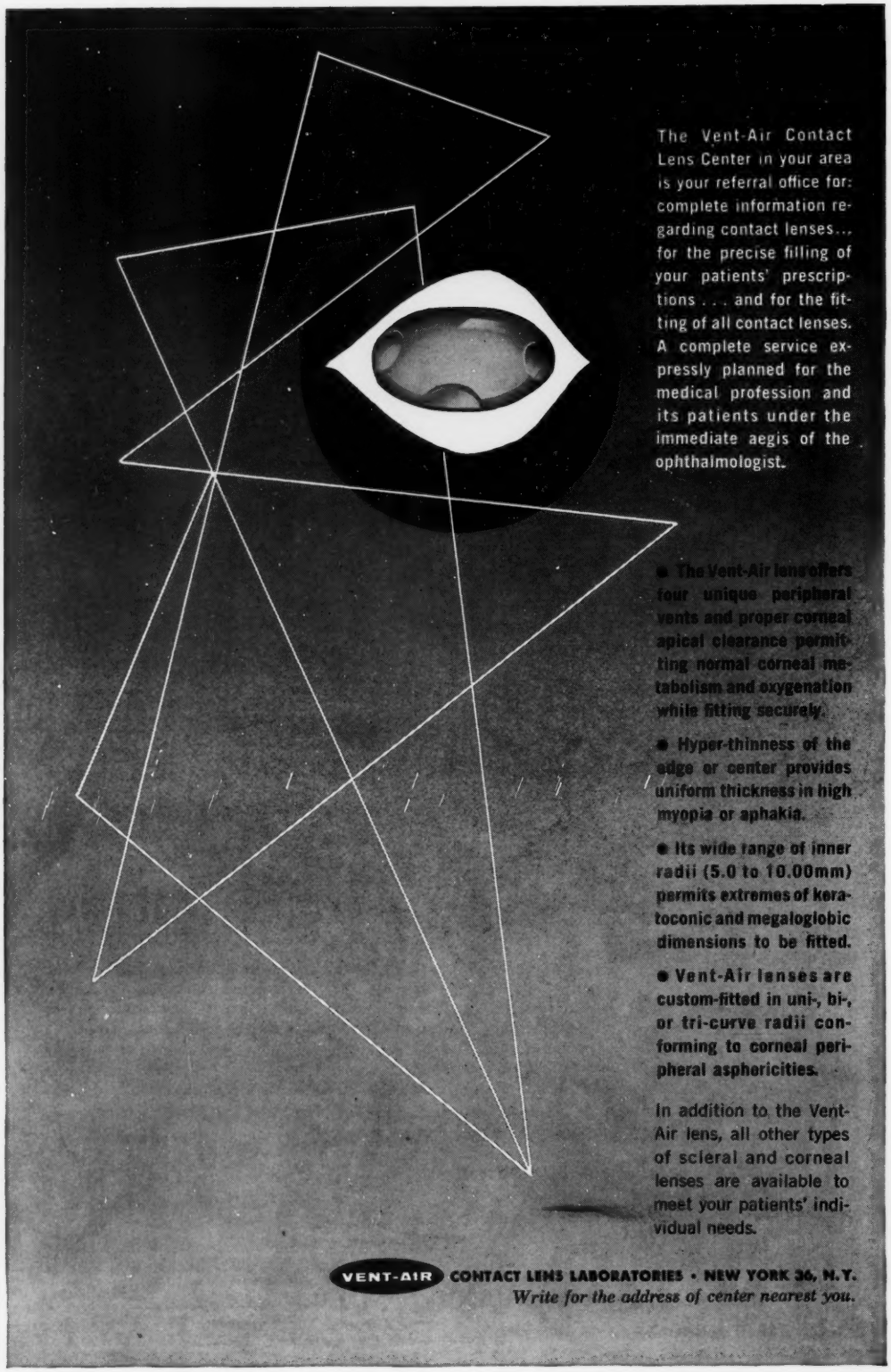
Supplied: In bottles of 100 and 500.

Formula: Each Medaprin tablet contains

- 300 mg. acetylsalicylic acid, for prompt relief of pain
- 1 mg. Medrol, to suppress the causative inflammation
- 200 mg. calcium carbonate, as buffer

*TRADEMARK **TRADEMARK, REG. U. S. PAT. OFF.—METHYLPREDNISOLONE, UPJOHN
†RATIO OF DESIRED EFFECTS TO UNDESIRED EFFECTS

The Upjohn Company, Kalamazoo, Michigan Upjohn


The Vent-Air Contact Lens Center in your area is your referral office for: complete information regarding contact lenses..., for the precise filling of your patients' prescriptions . . . and for the fitting of all contact lenses. A complete service expressly planned for the medical profession and its patients under the immediate aegis of the ophthalmologist.
● The Vent-Air lens offers four unique peripheral vents and proper corneal apical clearance permitting normal corneal metabolism and oxygenation while fitting securely.
● Hyper-thinness of the edge or center provides uniform thickness in high myopia or aphakia.
● Its wide range of inner radii (5.0 to 10.00mm) permits extremes of keratoconic and megaloglobic dimensions to be fitted.
● Vent-Air lenses are custom-fitted in uni-, bi-, or tri-curve radii conforming to corneal peripheral asphericities.
In addition to the Vent-Air lens, all other types of scleral and corneal lenses are available to meet your patients' individual needs.
VENT-AIR CONTACT LENS LABORATORIES • NEW YORK 36, N.Y.
Write for the address of center nearest you.

2½ minutes of your time reading about Trancopal may change your prescription habits when treating musculoskeletal and psychogenic disorders.

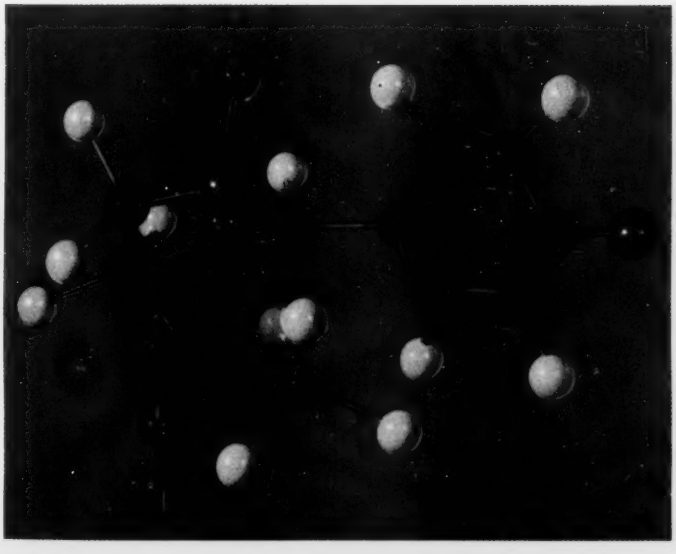
Trancopal®

*the first true tranquilaxant**

***Potent* MUSCLE RELAXANT**

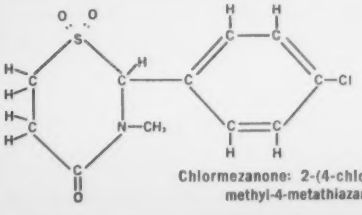
***...Equally effective as a* TRANQUILIZER**

***tran-qui-lax-ant** (tran'kwi-lak'sant) [< L. tranquillus, quiet; L. laxare, to loosen, as the muscles]



Trancopal, a major development of Winthrop research, is a new orally administered nonhypnotic central relaxant and tranquilizer. It relieves muscle spasm in a variety of musculoskeletal and neurologic conditions and also exerts a marked tranquilizing effect in anxiety and tension states.

Unrelated chemically to any other drug in current use, Trancopal offers a completely new major chemical contribution to therapeutics.



Chlormezanone: 2-(4-chlorophenyl)-3-methyl-4-metathiazanone-1-dioxide

Thoroughly evaluated clinically...

Clinical studies of 4092 patients by 105 physicians[1] have demonstrated that Trancopal often is effective when other drugs have failed. From these studies it is evident that Trancopal can provide more help for a greater number of tense, spastic, and/or emotionally upset patients than can any other chemotherapeutic agent in current use.

In musculoskeletal conditions[1]

effective in **91%** of patients

INDICATIONS

- Low back pain (lumbago)
- Bursitis
- Osteoarthritis
- Fibrositis
- Myositis
- Postoperative myalgias
- Neck pain (torticollis)
- Rheumatoid arthritis
- Disk syndrome
- Joint disorders (ankle sprain, tennis elbow, etc.)

By relieving muscle spasm and pain, Trancopal permits early and active purposeful exercise and physical therapy to accomplish maximal benefits for rapid recovery.

Trancopal

Dosage: One Caplet (100 mg.) orally three or four times daily. Relief of symptoms occurs in fifteen to thirty minutes and lasts from four to six hours.

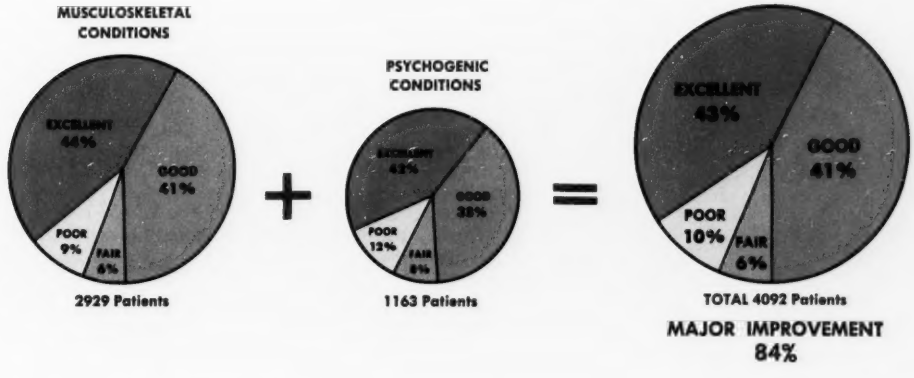
In anxiety and tension states[1]

effective in 88% of patients

INDICATIONS

Anxiety and tension states	Dysmenorrhea
Premenstrual tension	Asthma
Emphysema	Angina pectoris

Because of its exceptional calmative property, Trancopal "...allows the patient to use his energies in a more productive manner in overcoming his basic problem."[2]



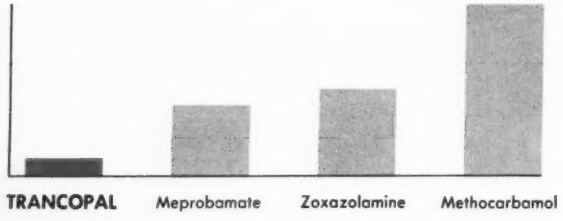
Of the total patients treated, Trancopal produced excellent results in 43 per cent, good results in 41 per cent, fair results in 6 per cent, and poor results in 10 per cent.

Better tolerated and safer than older drugs[3]

With Trancopal there is no clouding of consciousness, no euphoria or depression. Even in high dosage, there is no perceptible soporific effect. Because it does not irritate gastric mucosa, it can be taken without regard to mealtimes. Administration does not hamper work — or play. There are no known contraindications. Blood pressure, pulse rate, respiration and digestive processes are unaffected by therapeutic dosage.
Toxicity is extremely low. And Trancopal has a lower incidence of side effects than has zoxazolamine, methocarbamol or meprobamate.

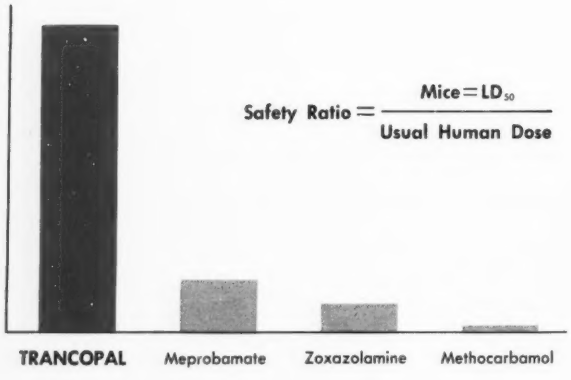
Comparison with 3 widely used central relaxants

When compared with three widely used central relaxants for activity, safety and clinical effectiveness, Trancopal offers definite desirable advantages.



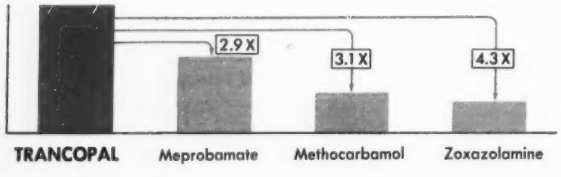
for activity

In the usual human dose, Trancopal is four to ten times as potent per milligram.



for safety

Comparative pharmacologic tests showed that Trancopal is up to thirteen times as safe or up to thirteen times less toxic. The measure of safety was the LD_{50} in mice/usual human dose.



for clinical effectiveness

A clinical comparison in low back pain, torticollis, bursitis and anxiety states showed that Trancopal is up to four times as effective. Each of the 40 patients received all four drugs in random rotation for several days. Although each of the four gave some relief, only the one providing the most effective relief was recorded.

Supplied: Trancopal Caplets® (scored) 100 mg., bottles of 100.

References: 1. Cooperative Study, Department of Medical Research, Winthrop Laboratories. • 2. Gans, S.E.: To be published. • 3. Lichtman, A.L.: Kentucky Acad. Gen. Pract. J. 4:28, Oct., 1958.

the first true tranquilaxant

Trancopal

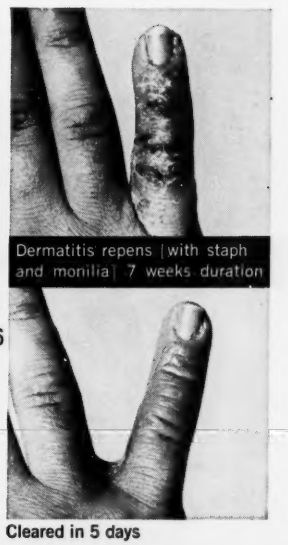
Potent
MUSCLE RELAXANT
...Equally effective as a
TRANQUILIZER

Winthrop Laboratories / **New York 18, New York**

Trancopal (brand of chlormezanone) and Caplets, trademarks reg. U. S. Pat. Off.

Printed in U. S. A. 3-59 (4027)

new for total management of itching,[1,2] inflamed,[3,4] infected[5,6] skin lesions

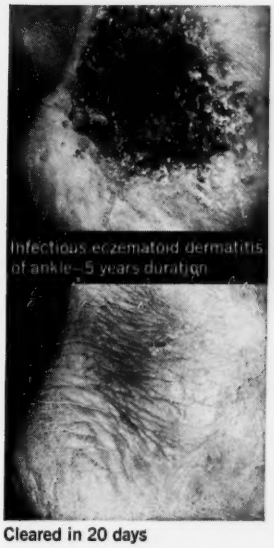


Cleared in 5 days

Mycolog ointment

Kenalog, Spectrocin and Mycostatin in Plastibase

antipruritic/anti-inflammatory/antibacterial/antifungal



Cleared in 20 days

Mycolog Ointment — containing the new superior topical corticoid Kenalog — reduces inflammation,[3,4] relieves itching,[1,2] and combats or prevents bacterial, monilial and mixed infections.[5-7] It is extremely well tolerated, and assures a rapid, decisive clinical response for most infected dermatoses.

> "Thirty-one of 38 patients . . . obtained excellent or good control of dermatological lesions . . . [Mycolog] was highly effective, particularly in the management of mixed infections. Several recalcitrant eruptions which had not responded to previous therapy were remarkably responsive to the daily application of this preparation over periods of 2 to 3 weeks."[5]

For total management of itching, inflamed, infected skin lesions, Mycolog contains triamcinolone acetonide, an outstanding new topical corticoid for prompt, effective relief of itching, burning and inflammation[1-4] — neomycin and gramicidin for powerful antibacterial action[7] — and nystatin for treating or preventing Candida (Monilia) albicans infections.[8,9]

Application: Apply 2 to 3 times daily. Supply: 5 Gm. and 15 Gm. tubes. Each gram supplies 1.0 mg. (0.1%) triamcinolone acetonide, 2.5 mg. neomycin base, 0.25 mg. gramicidin, and 100,000 units nystatin in PLASTIBASE.

References: 1. Shelmire, J.B., Jr.: Monographs on Therapy 3:164 (Nov.) 1958. • 2. Nix, T.E., Jr., and Derbes, V.J.: Monographs on Therapy 3:123 (Nov.) 1958. • 3. Robinson, R.C.V.: Bull. School of Med., U. Maryland 43:54 (July) 1958. • 4. Sternberg, T.H.: Newcomer, V.D., and Reisner, R.M.: Monographs on Therapy 3:115 (Nov.) 1958. • 5. Clark, R.F., and Hallett, J.J.: Monographs on Therapy, 3:153 (Nov.) 1958. • 6. Smith J.G., Jr.; Zawisza, R.J., and Blank, H.: Monographs on Therapy, 3:111 (Nov.) 1958. • 7. Monographs on Therapy, 3:137 (Nov.) 1958. • 8. Howell, C.M., Jr.: North Carolina M.J. 19:449 (Oct.) 1958. • 9. Bereston, E.S.: South. M.J. 50:547 (April) 1957.

And whatever the topical corticoid need, a suitable Squibb formulation is available—Kenalog-S Lotion—7½ cc. plastic squeeze bottles. Each cc. supplies 1.0 mg. (0.1%) triamcinolone acetonide, 2.5 mg. neomycin base and 0.25 mg. gramicidin. Kenalog Cream, 0.1%—5 Gm. and 15 Gm. tubes. Kenalog Lotion, 0.1%—15 cc. plastic squeeze bottles. Kenalog Ointment, 0.1%—5 Gm. and 15 Gm. tubes.

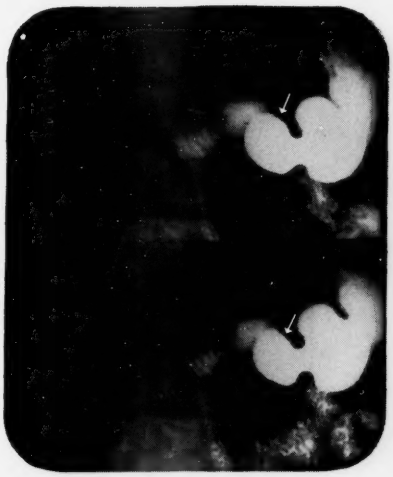
SQUIBB

Squibb Quality — the Priceless Ingredient

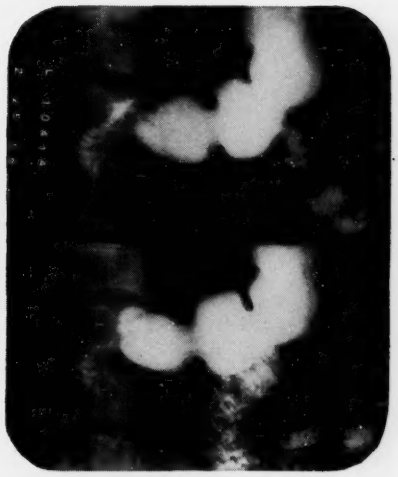
'SPECTROCIN'®, 'MYCOSTATIN'®, 'PLASTIBASE'®, 'MYCOLOG' AND 'KENALOG' ARE SQUIBB TRADEMARKS

relieve the tension

—and control its G.I. sequelae



Patient A.S., age 53.
Intermittent crises of severe pain over 2 year period; hospital management with Sippy regimen provided relief of symptoms; however, symptoms recurred after each sojourn.



PATHIBAMATE *(Tabs. j t.i.d. and H.S.);* prompt relief of symptoms. Radiograph (21 days later) confirms healing of minute lesser curvature gastric ulcer crater.

predictable results in the control of tension and G.I. trauma

Pathibamate®

Meprobamate with PATHILON® Tridihexethyl Chloride* LEDERLE

Used prophylactically in anticipation of periods of emotional stress, or therapeutically to relieve tension and curb hypermotility and hypersecretion, PATHIBAMATE is particularly well-formulated for the control of gastrointestinal disorders.

PATHIBAMATE combines Meprobamate (400 mg.) — the noted tranquilizer-muscle relaxant widely accepted for safe management of tension and anxiety states — and PATHILON (25 mg.) — an extremely well-tolerated anticholinergic, long noted for prompt symptomatic relief based on peripheral atropine-like action with few side effects.

Indications:
Duodenal ulcer, gastric ulcer, intestinal colic, spastic and irritable colon, ileitis, esophageal spasm, anxiety neurosis with gastrointestinal symptoms, gastric hypermotility.

Supplied:
Bottles of 100 and 1,000. Each tablet (yellow, ½-scored) contains Meprobamate, 400 mg.; PATHILON Tridihexethyl Chloride, 25 mg.

Administration and Dosage:
1 tablet three times a day at mealtimes and 2 tablets at bedtime. Adjust dosage to patient response. Contraindicated in glaucoma, pyloric obstruction, and obstruction of the urinary bladder neck.

Also Available: PATHILON in four forms — *Tablets* of 25 mg., plain (pink) or with *phenobarbital*, 15 mg. (blue);
Parenteral — 10 mg./cc. — 1 cc. ampuls;
Pediatric Drops — 5 mg./cc. — dropper vials of 15 cc.

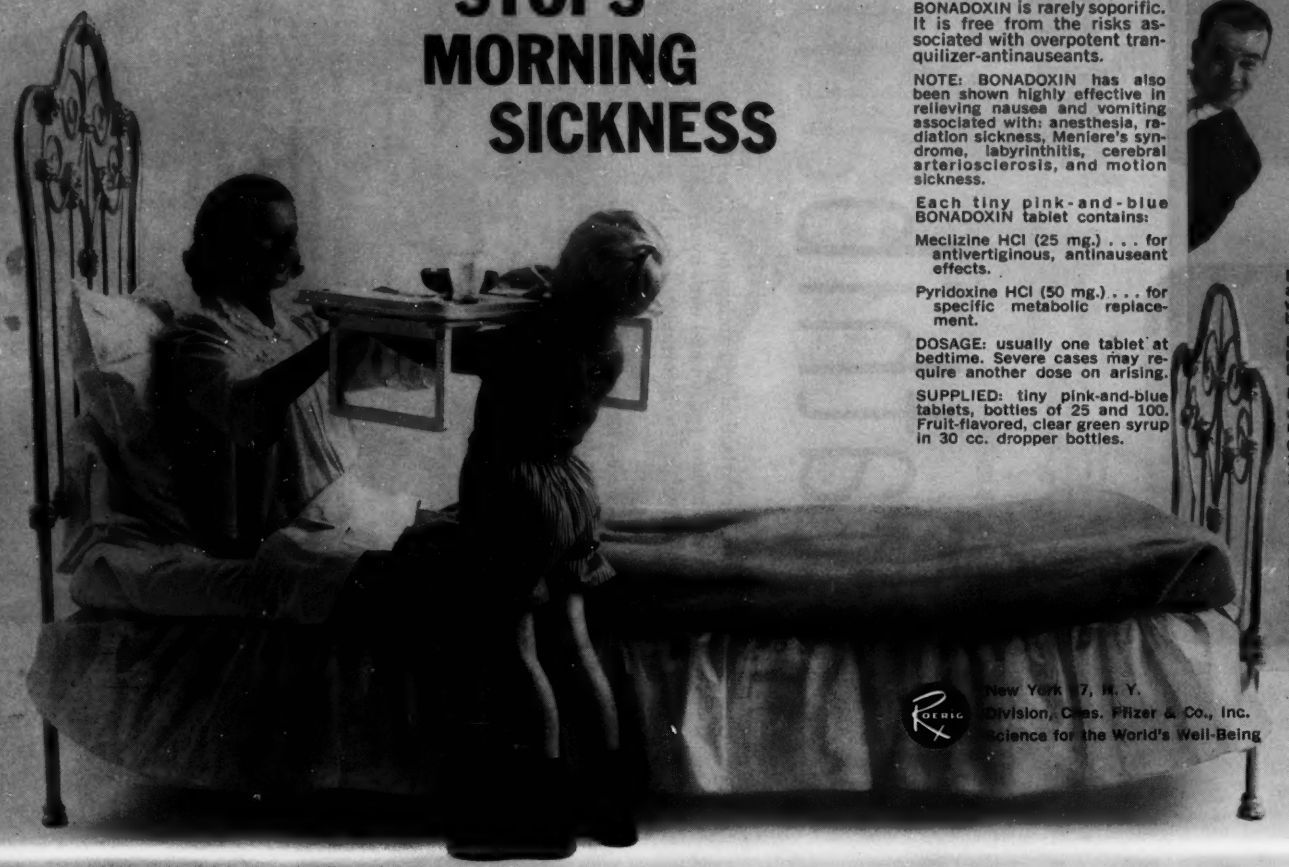
*PATHILON is now offered as tridihexethyl chloride instead of the iodide, an advantage permitting wider use, since the latter could interfere with the results of certain thyroid function tests.

Lederle LEDERLE LABORATORIES, A Division of AMERICAN CYANAMID COMPANY, Pearl River, New York

BONADOXIN®

(tablets and drops)

STOPS STOPS STOPS MORNING SICKNESS



BONADOXIN Tablets relieve nausea and vomiting of pregnancy in 9 out of 10,[1-7] often within a few hours.

Moreover, a controlled study of 620 cases reported that with **BONADOXIN** "toxicity and intolerance [are] zero."[1] **BONADOXIN** is rarely soporific. It is free from the risks associated with overpotent tranquilizer-antinauseants.

NOTE: **BONADOXIN** has also been shown highly effective in relieving nausea and vomiting associated with: anesthesia, radiation sickness, Meniere's syndrome, labyrinthitis, cerebral arteriosclerosis, and motion sickness.

Each tiny pink-and-blue **BONADOXIN** tablet contains:

Meclizine HCl (25 mg.) . . . for antivertiginous, antinauseant effects.

Pyridoxine HCl (50 mg.) . . . for specific metabolic replacement.

DOSAGE: usually one tablet at bedtime. Severe cases may require another dose on arising.

SUPPLIED: tiny pink-and-blue tablets, bottles of 25 and 100. Fruit-flavored, clear green syrup in 30 cc. dropper bottles.

Infant colic? **BONADOXIN DROPS** are antispasmodic . . . stop colic in 84%,[8-10] without the risk of belladonna and barbiturates.

Each cc. contains:
Meclizine dihydrochloride . . 8.33 mg.
Pyridoxine hydrochloride . . . 16.67 mg.

Dosage:

under 6 months . . . . 0.5 cc.	2 or 3 times daily, on the tongue, in fruit juice or water
6 months to 2 years . . . . 1.5 to 2 cc.	
2 to 6 years . . 3 cc.	
adults and children over 6 . . . . . 1 tsp. (5 cc.)	

References: 1. Goldsmith, J. W.: Minnesota Med. 40:99 (Feb.) 1957. 2. Groskloss, H. H., et al.: Clin. Med. 2:885 (Sept.) 1955. 3. Weinberg, A., and Werner, W. E. F.: Am. Pract. & Digest Treat. 6:580 (April) 1955. 4. Crawley, C. R.: West. J. Surg. 8:463 (Aug.) 1956. 5. Tartikoff, G.: Clin. Med. 3:223 (March) 1955. 6. Dunn, R. D., and Fox, L. P.: Clinical exhibit. 7. Codling, J. W., and Lowden, R. J.: Northwest Med. 57:331 (March) 1958. 8. Dougan, H. T.: Personal communication. 9. Leonard, C. L.: Personal communication. 10. Steinberg, C. L.: Personal communication.

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Division, Chas. Pfizer & Co., Inc.
Science for the World's Well-Being

Clear the air

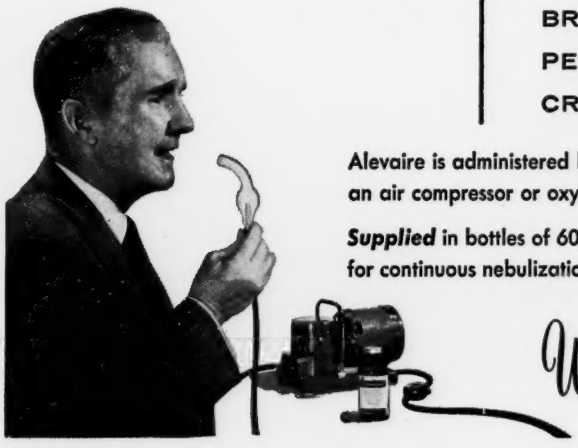
with ALEVAIRE®

inhalation therapy

WETS, THINS, LOOSENS PULMONARY SECRETIONS

Very useful in...

... BRONCHITIS
BRONCHIAL ASTHMA
BRONCHIECTASIS
PERTUSSIS
CROUP



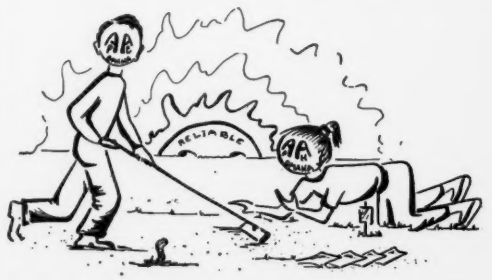
Alevaire is administered by means of a nebulizer operated with an air compressor or oxygen.

Supplied in bottles of 60 cc. for intermittent and 500 cc. for continuous nebulization.

Winthrop LABORATORIES
NEW YORK 18, N. Y.

Alevaire, trademark reg. U.S. Pat. Off.

LEDERLE LABORATORIES, a Division of AMERICAN CYANAMID COMPANY, Pearl River, New York



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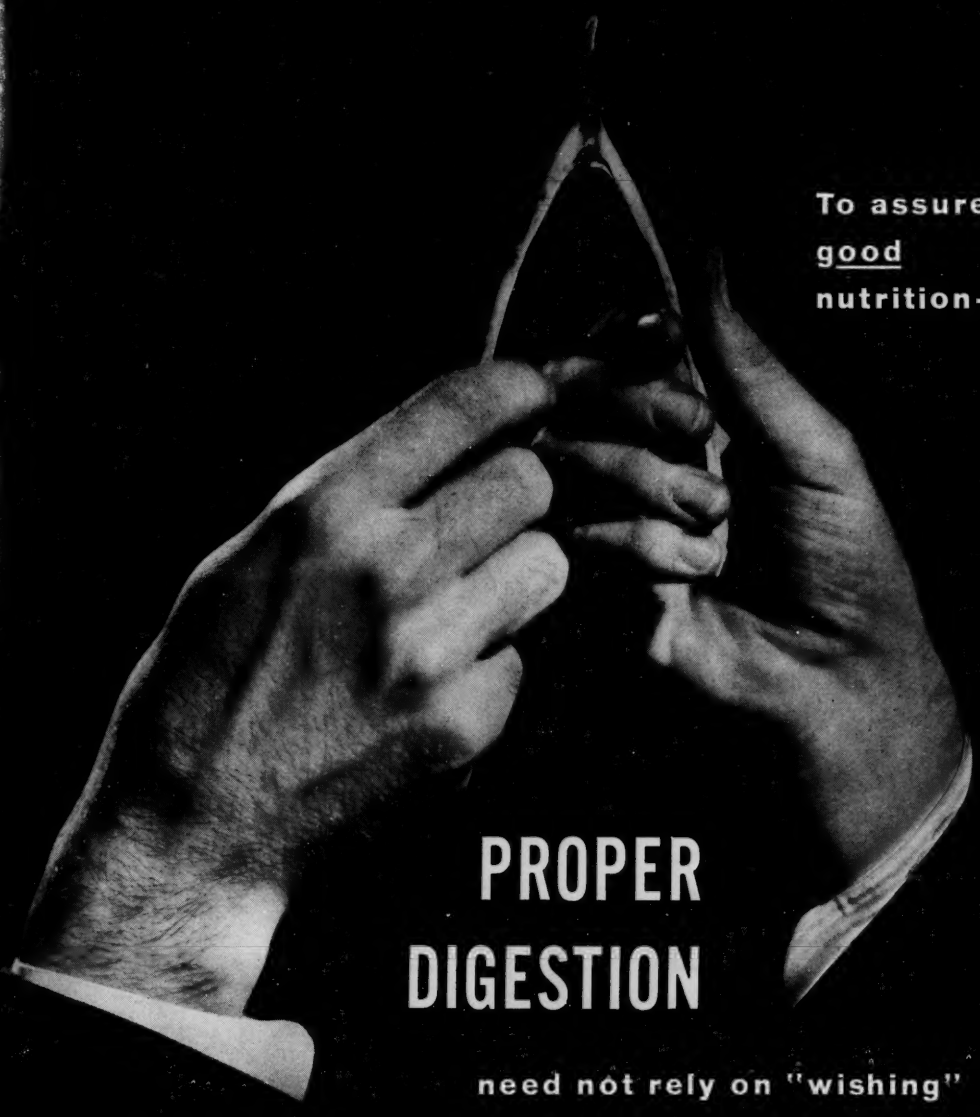


To assure good nutrition—

PROPER DIGESTION

need not rely on "wishing"

Each double-layered Entozyme tablet contains:

Pepsin, N.F.	250 mg.
—released in the stomach from gastric-soluble outer coating of tablet.	
Pancreatin, U.S.P.	300 mg.
Bile Salts	150 mg.
—released in the small intestine from enteric-coated inner core.	

A. H. ROBINS CO., INC.
Richmond 20, Virginia
Ethical Pharmaceuticals of Merit since 1878

As a comprehensive supplement to deficient natural secretion of digestive enzymes, particularly in older patients, ENTOZYME effectively improves nutrition by bridging the gap between adequate ingestion and proper digestion. Among patients of all ages, it has proved helpful in chronic cholecystitis, post-cholecystectomy syndrome, subtotal gastrectomy, pancreatitis, dyspepsia, food intolerance, flatulence, nausea and chronic nutritional disturbances.

For comprehensive digestive enzyme replacement—

ENTOZYME

Robins

ONE OF THE
MOST

SIGNIFICANT IMPROVEMENTS

IN
ANTACID
THERAPY

SINCE THE INTRODUCTION OF ALUMINUM HYDROXIDE
IN 1929

NEW

CREAMALIN®

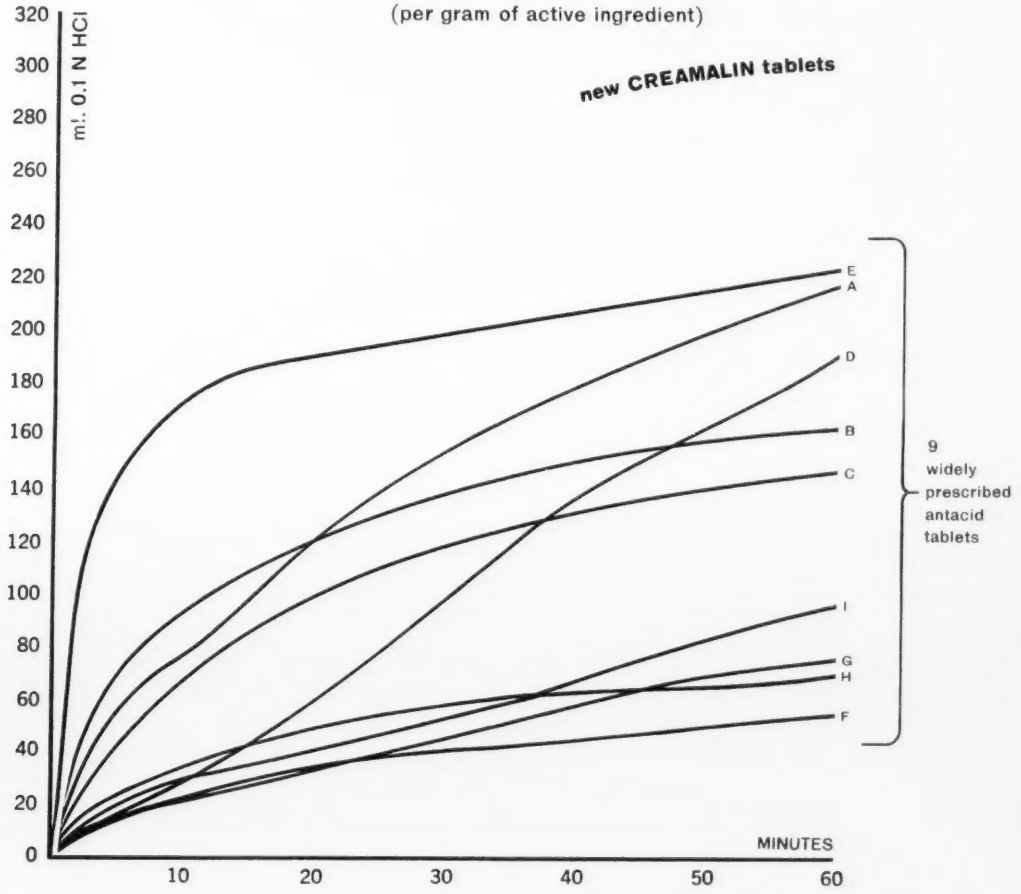
ANTACID TABLETS

Each Creamalin Antacid Tablet contains 320 mg. specially processed, highly reactive, short polymer dried aluminum hydroxide gel, stabilized with hexitol, with 75 mg. magnesium hydroxide.

1. *Neutralizes acid faster (quicker relief)*
2. *Neutralizes more acid (greater relief)*
3. *Neutralizes acid longer (more lasting relief)*
4. *No constipation · No acid rebound*
5. *More pleasant to take*

Quicker Relief · Greater Relief

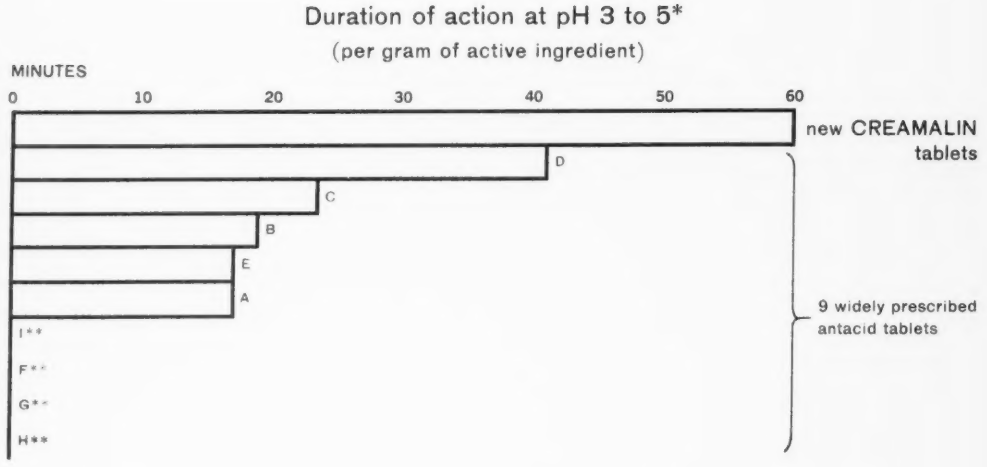
Acid neutralization with 10 leading antacid tablets*
(per gram of active ingredient)



Tablets were powdered and suspended in distilled water in a constant temperature container (37°C) equipped with mechanical stirrer and pH electrodes. Hydrochloric acid was added as needed to maintain the pH at 3.5. Volume of acid required was recorded at frequent intervals for one hour.

*Hinkel, E. T., Jr., Fisher, M. P. and Tainter, M. L.: A new highly reactive aluminum hydroxide complex for gastric hyperacidity. To be published

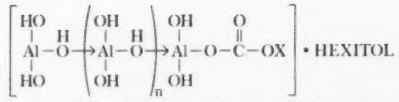
More Lasting Relief



*Hinkel, E. T., Jr., Fisher, M. P. and Tainter, M. L. A new highly reactive aluminum hydroxide complex for gastric hyperacidity. To be published.
**pH stayed below 3

NEW

No chalky taste. New CREAMALIN tablets are not chalky, gritty, rough or dry. They are highy palatable, soft, smooth, easy to chew, mint flavored.



n is at least 1 and averages less than 6. X is a cation.

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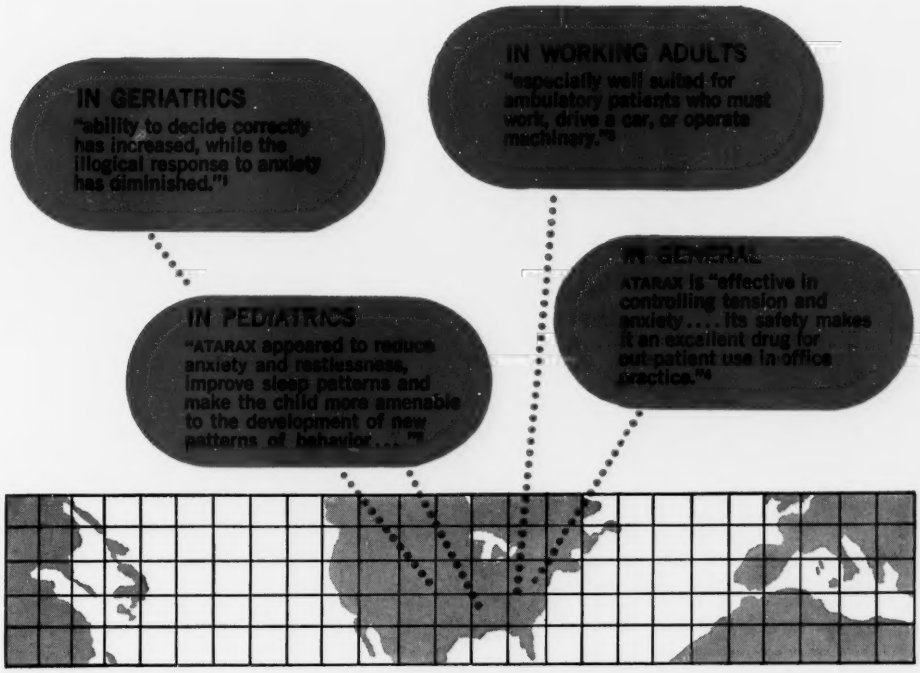
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